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Employs Mass Production Methods for Fabricating Gas Stoves

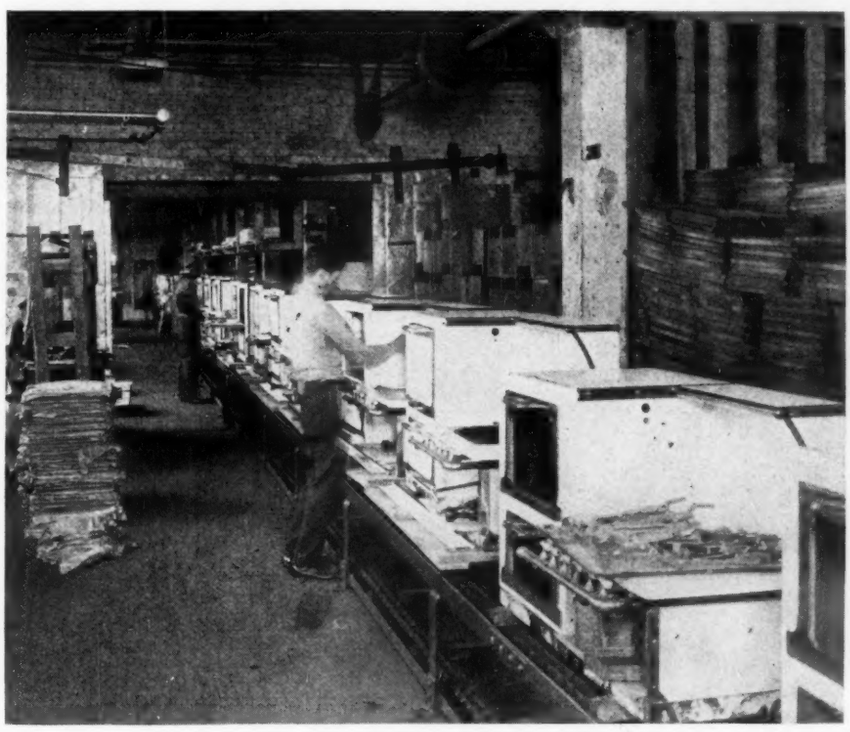
By Wilson A. Smith

WHILE progress in the art of cooking appliances was spread over many years the development of the modern stove is comparatively recent and contemporary with the making of modern civilization. One of the pioneers in the development and manufacture of cook stoves is the Cribben & Sexton Co., Chicago, having been engaged in this work for over 55 years. Up until 30 years ago the bulk of this company's business was in plumbing supplies, bath tubs, lavatories, etc. Selling out this branch it swung into the production of coal ranges and gas stoves and today is one of the largest manufacturers of the latter in the world. The output of the plant is around 50,000 gas stoves annually, in addition to the coal ranges.

The plant is modern in every respect and covers more than 9 acres of ground. It includes a foundry, machine shop, press room, enameling department, plating and polishing and assembly. The foundry has two cupolas and is served with overhead cranes and electric trucks on the floor. Molders benches equipped with air squeezers are arranged along one wall and the flasks are delivered to the pouring floor by truck while the molten iron is handled in ladles swung from the overhead cranes.

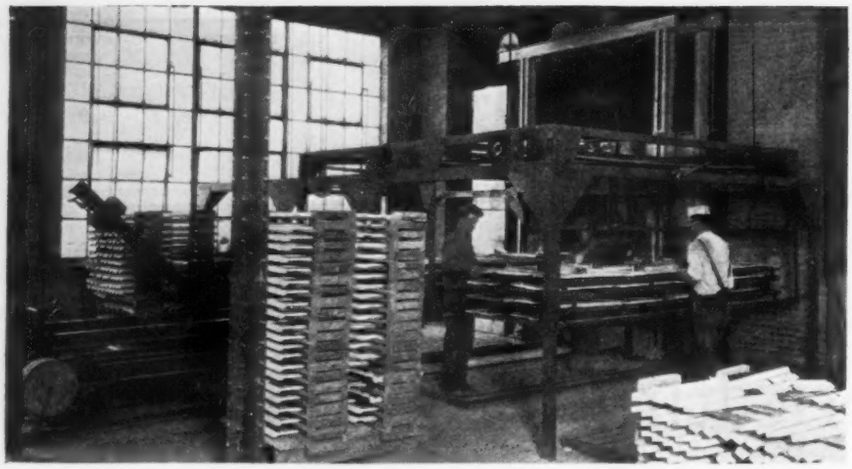
One side of the foundry is devoted to the core room, the core ovens being placed against the wall and the coremakers stands forming a line in front with an aisle in between. Racks for the completed cores awaiting delivery to the molders form another and parallel line. The ovens consist of eight double-chambered units each about 6 feet wide, 6 feet deep and 7 feet high. Each oven has seven shelves bolted to the door and in the shape of a quadrant. They are direct fired with gas utilizing the system developed by the Surface Combustion Co., Toledo, O.

The castings go from the foundry to the cleaning room where they are tumbled to rid them of the gates and imperfections and then are sandblasted to smooth sufficiently to receive the enamel. Those parts which are nickel plated go to the plating department where standard practice and equipment are used. In the polishing room are some special machines such as the one used



Final assembly of stoves is accomplished on an endless conveyor

The author, Wilson A. Smith, is vice president and general manager, Cribben & Sexton Co., Chicago.



Enameled parts being loaded in deck fashion preparatory to baking

for polishing stove tops. This is 50 feet long, consists of 24 emery wheels and is entirely automatic in its operation. A moving platform carries the stove tops along under the different wheels. There is also an automatic pipe polisher which employs rotating idlers to force the pipes along and against power-driven emery belts.

The drill room is completely equipped. One of the presses used to drill burners, will bore 32 holes in a single operation. There are 15 drill presses provided. The press room houses ten large and numerous small power presses, power shears, brakes, etc. Here are cut and formed the box parts of the stoves, linings, doors, oven bodies, drip pans, etc. The machine shop is completely equipped for the making of all tools, dies, jigs, etc., used in the plant proper.

Perhaps the most interesting process in the plant is that of enameling. A special enameling mixing room is equipped with every machine and device for the preparation and mixing of all kinds of enamel. In the spraying department are long lines of spraying booths equipped with air pressure guns and batteries of enamel vats for dipping the first or ground coat on steel. Most of this is 18, 20 and 22 gage steel sheets. A separate department with booths and vats for enameling the cast iron parts is provided.

Ground Coat By Dipping

The ground coat is applied by dipping and then is burned or fused in one of the ovens. After the first color coat is applied and dried the edges are brushed down to the ground coat in brushing wheels to give an attractive trim to the parts and also to protect against enamel chipping on those edges where the parts are bolted together. The first color coat is then burned on and the second coat applied and treated in the same manner.

In the burning department are three types of gas-fired enameling furnaces, namely, the intermittent, semimuffle and full muffle types, eight in all. Two coal burning furnaces are still in operation. The ground coat is baked at 1650 and the other two coats at 1580 degrees Fahr. The furnace installations comprise a semimuffle type 4 x 10 feet and two full muffle units, 5 x 12 feet each. There are also five, 4 x 4-foot semimuffle furnaces, all served with speed forks. The 4 x 10-foot unit was of the intermittent type before it was converted to gas. While ordinary gas burners first were used in most of these units they since have been supplanted by burners equipped with accurate gas-air proportioners. These effect a fuel saving of approximately 20 per cent over the old type.

Much valuable comparative data has been obtained on the three types of furnaces which have been operated under exactly the same conditions as well as the same class of work. This information shows that the 4 x 10-foot intermittent furnace averaged only 10 heats an hour and produced only 200 square feet of work with 1640 cubic feet of gas, under actual average operating conditions. When converted to gas as utilized by the new burner equipment and to the semimuffle type, this same unit produced on an average of 22 heats an hour burning 440 square feet of work with a gas consumption of only 1200 cubic feet an hour. When converted to full muffle the gas consumption was increased by 10 per cent which was in accord with past experience as about 200 degrees Fahr. higher temperature is necessary in the flue gases of the full muffle furnace, than in the semimuffle flue gases in order to maintain the same

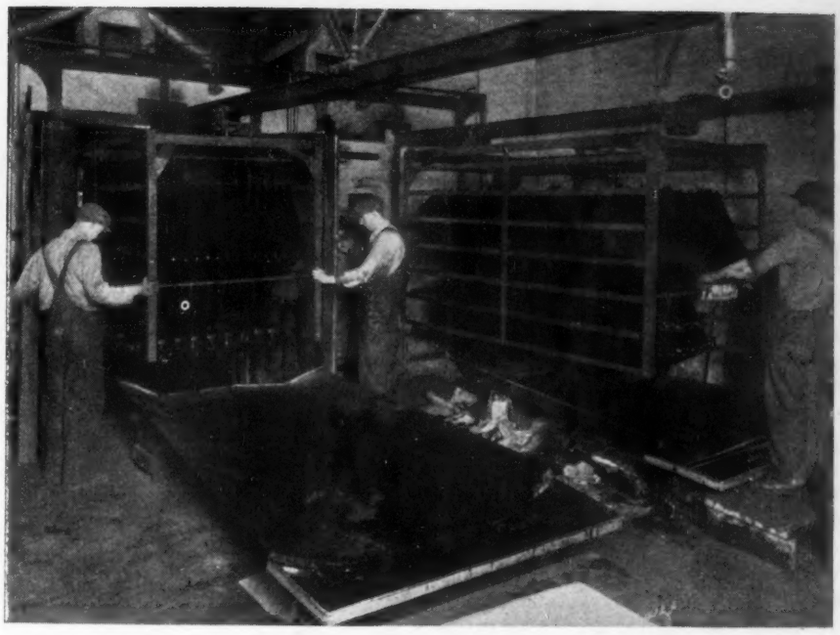
Interior view of the foundry where castings for the various stove parts are made. The flasks are delivered to the molding floor by truck, while iron is handled by overhead cranes

temperature in the working chamber. The temperatures are approximately 1900 degrees Fahr. on the full and 1700 degrees on the semimuffle, for a working chamber temperature of 1650 degrees. However, as the heat in the flue or waste gases is used, this extra gas is not lost.

One of the 5 x 12-foot units is used for burning enamel on cast iron parts and the work is loaded four decks high. It will burn out from 7500 to 10,000 pounds of ware daily. Automatic temperature controls are provided with these furnaces which eliminates the human equation in heat regulation.

Time losses due to repairs, is another factor of prime importance, that has been materially reduced by the new furnaces. Tests show the operating cost of the 4 x 10-foot gas furnace is $77.41 per day of 22 hours which is equivalent to $0.0088 per square foot of single coat burned.

The final assembly of stoves is similar to the final assembly of an automobile. Endless traveling belts or conveyors carry the stoves in their embryonic and development stages, workmen lined up on both sides putting parts on progressively until the entire unit is assembled. A gas hose is fastened to the manifold and the stove is tested before being packed and conveyed to the shipping department.



Rack load of enameled stove parts being charged into baking oven

Coke Output Declines in November

Production of by-product coke in November was 4,122,150 net tons, compared with 4,219,262 tons in October and 3,500,000 last November, states the federal bureau of mines.

Output of beehive coke in November was 416,000 net tons, against 421,000 tons in October and 379,000 in November, 1927.

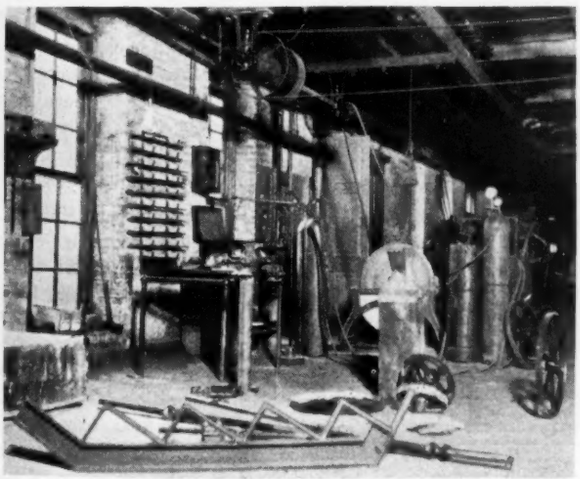
Cumulative production of by-product coke in the first 11 months of 1928 has been 43,877,636 net tons, against 40,274,884 tons in the same period of 1927. For beehive coke the 11-month figure for 1928 is 3,978,000 tons and for 1927, 6,627,000 tons.

File Making Lessens

Establishments manufacturing files declined from 38 in 1925 to 36 in 1927, according to the biennial census of manufactures by the department of commerce. Production was as follows: Metalworking, $11,854,620, woodworking, $95,743; other files, $396,166; other products and amount received for repair work, $627,205, making a total of $12,973,734, a decrease of 4.2 per cent as compared with $13,540,953 for 1925, the last preceding census year.

Of the 36 establishments reporting for 1927, 7 were located in New Jersey, 7 in Pennsylvania, 5 in New York, 5 in Ohio, 3 in Rhode Island, 2 in Connecticut, 2 in Illinois, 2 in Indiana, 1 in Iowa, 1 in Massachusetts, and 1 in Michigan. In 1925 the industry was represented by 38 establishments, the decrease to 36 in 1927 being the net result of a loss of three and a gain of one.

Central Welding Shop Reduces Operating Expenses



NEW and profitable applications of oxyacetylene welding and cutting in the manufacturing plant often are brought to light by the establishment of a central welding shop in the plant. The definite location of a welding shop within a plant, such as shown in the accompanying illustration, accomplishes several things. Operators know where to find apparatus; shop foremen know where to go to have welding jobs done; it is possible to have a welding foreman of more than ordinary ability; and executives have a means of keeping track of welding costs. Appreciable economies in production, maintenance and repair work are said to be effected by the modern progressive central welding shop. The number and diversity of jobs which can be done by such a department insure sufficient work to keep it busy.

Sound Business Methods Needed in Foreign Machinery Trade

TO A considerable degree the problem of increasing American machinery sales abroad is that of marketing standardized products of superior quantity and relatively high price in competition, if that word is appropriate, with foreign products whose designs frequently do not embody the same excellence, whose materials are not selected with such good judgment, if indeed such materials are obtainable, and whose workmanship is not so good especially if judged by standards of accuracy and appropriate finish as distinguished from paint and unnecessary polish.

No broad campaign for foreign business should be started until the necessary domestic organization has been developed. Export business is good business and worth sustained effort. Some large American firms depend to a considerable extent upon their foreign markets. Our industrial machinery export trade is becoming of vital interest; it represents the difference between profit and loss in the operation of the average plant.

Proper Preparation Needed

Export business can be secured on terms that are clean and attractive, but to sell without proper preparation is only to sell trouble. Manufacturers should keep out of foreign trade until prepared to handle it properly. These remarks should not be interpreted to mean that foreign trade is especially difficult, for, properly approached by competent people, it is easily handled and clean business. Americans can handle the trade as well as anyone else, as is demonstrated by the accompanying charts showing the value of American machinery trade abroad and the percentages of the total trade going to the various countries indicated.

Select Foreign Representatives

While it is possible to imagine any number of different forms of organization that might be employed in the sale of American machinery in foreign countries, the problem is really simple, for industrial machinery sold abroad, whether American, European, or of other origin, is usually marketed through the machinery dealers who are established in the various foreign cities and who act as import merchants. Usually the problem of developing an organization abroad consists in establishing and maintaining the best possible contacts with these dealers.

To insure that equipment is supported by genuinely constructive salesmanship in each territory, manufacturers usually find that the most practicable method is to arrange an exclusive sales agreement for each particular market, at the same time arranging to have the distributor employ a sales engineer who has been trained by the manufacturer.

Unquestionably the best way to select a representative is to gather all possible information in the United States and then visit the foreign countries to investigate the matter and come to an agreement on the spot. Naturally, the idea of granting an exclusive sales agreement is to stimulate the machinery distributor abroad to creative, constructive sales effort, thereby adding to the profits of both manufacturer and dealer. If business is not stimulated, the arrangement is a failure. To make a success, a dealer first of all needs to have an organization for an interest in the sale of machinery, and he must be in a position to cover the entire territory under consideration. He should have his engineering department in the hands of qualified engineers who understand the class of machinery involved and the country in which they are to work.

When arranging for the appointment of a representative, the manufacturer should also arrange for such supervision of this dealer as is necessary to protect and promote the interests of the manufacturer. There are many ways by which this can be done. More and more the better merchants and manufacturers are arranging to have a qualified sales manager join the staff of the representative in each important foreign office.

Sound Business Essential

In domestic business it is necessary to adopt sound business methods. In foreign trade the need is far more urgent. In domestic trade errors can be corrected. It is easy and not expensive for the branch office to write or telegraph in case of trouble. Branch managers can often step on a train and in the evening and be at the plant in the morning. The business has the advantage of the verbal message and close contact between factory and user, but in trade with distant countries these methods are not possible. To visit the plant is impracticable; the telephone does not connect, cablegrams are costly, and letters require, say, a month each way. Mistakes are expensive and must not occur. Substitutions mean trouble and dissatisfaction. No matter how perfect the organization abroad may be, it can accomplish only as much as the home organization makes possible.

In domestic business the head office must ordinarily take the initiative in matters of policy; it must supervise the whole organization, and it must

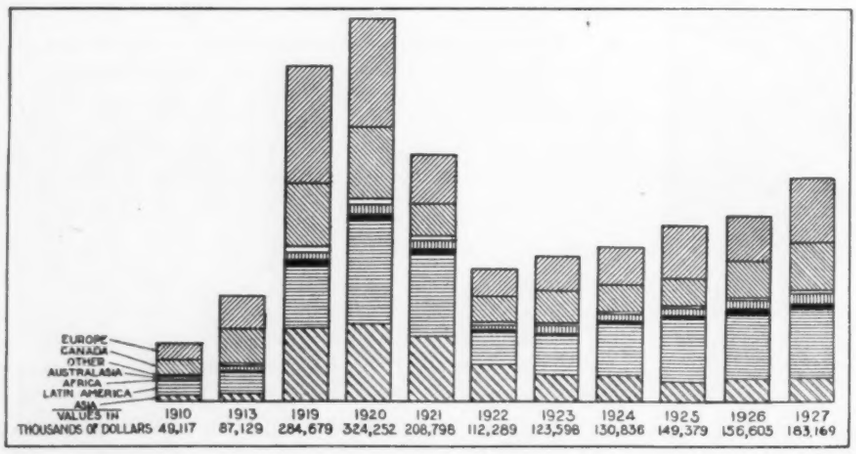


Chart showing changes in destination of United States industrial machinery exports by valuations

co-operate with the branches. In foreign business this is all necessary to an even higher degree. A staff should be developed that can be depended upon to handle correspondence and documents with a full realization of their meaning. The routine of shipping, insurance, and customs should be fully understood, as should also the meaning of various terms used on bills of lading, insurance policies, and other documents. The division of responsibility between manufacturer, carrier, export merchant, and consignee as involved in oversea trade should be fully appreciated.

The importance of deliveries can not be too greatly stressed. When a foreign customer requires a certain delivery, every possible means should be taken to make delivery by the time specified. If this is not done, the manufacturer creates a bad impression in the customer's mind. This impression is difficult to overcome and may in some instances result in the customer's refusal to accept the goods after delivery.

Weakness in these matters results in discredit abroad, while punctilious attention to them goes a long way toward establishing confidence, not only in the manufacturer but also in his products. The foreign customer buys service.

Supervision of Sales

If a manufacturer takes interest in his representative and establishes close relations with him, it then becomes easy to exercise supervision over these foreign sales. Obviously nothing will be gained by mere interference, but constructive efforts will be appreciated. Close contact will demonstrate the value of a given territory, the reason why orders are secured or business lost, and the needs of the sales organization. Frequently it will be discovered that the dealer needs additional sales data. Ordinarily he is not an expert in every particular line and needs guidance and instruction.

In many instances it has been found that the sales representative does not thoroughly understand the equipment he is selling. He tries to sell the products with all the attachments suitable in domestic manufacturing, but far from suitable for the average foreign manufacturing plant. American manufacturers must realize that foreign methods are still behind ours in the matter of production. The large volume turned out by our machines could not possibly be handled in the average foreign plant without a complete re-equipping of the entire factory. If the sales representatives understood more fully just what the machines could do in their most simplified form, they would possibly be able to make more foreign sales.

This raises again the question of the sales policy. Manufacturers seem to be guilty of confused thinking on the fundamentals of an arrangement covering their representation. Some seem anxious to receive everything and give nothing. They are anxious to develop a good business abroad but, being unable to do so themselves, are unwilling to allow a representative such an opportunity and such protection as are necessary, if constructive methods are to be applied. Pioneering work in the building of business is hard costly work, and a merchant is not justified in incurring the expense it involves unless he is assured that he will participate in its profits. If a manufacturer wants to develop a territory and expects a representative to do constructive work to that end, he should have a clear understanding on the following points:

1. Are all inquiries from the territory to be referred to the representative?
2. Is the representative to be protected on all quotations that he may ask to be made direct?
3. Is the representative to receive commission on sales made in his territory through others? Will these be paid before the representative requests them?
4. Is he to have full details regarding these sales, so as to derive advertising value from the installations when this may be possible?
5. Are prices quoted to him to equal the lowest domestic price less the cost of domestic sales? (His sales expense corresponds to that of the domestic sales force.)
6. Is a definite amount of product to be allocated to his territory even to the disadvantage of the domestic business in prosperous times?
7. Is he to be allowed an appropriation for advertising comparable with the domesitc allowance?
8. How will the home organization co-operate with the agent?
9. How is the sales-promotion work to be supervised?

Customers Demand Service

The question of servicing equipment has arisen many times abroad, and, generally, when a sales agent or representative is representing the manufacturer, he is not in a position to give technical advice needed. The manufacturer will find that the more he can service his machinery and help the customer and sales representative through practical advice, the greater will be the benefits he will reap in

American Machinery Exports Are High

EXPORTS of factory, mining and construction machinery from the United States occupy a unique position in our business world. American machinery is distinguished for its labor-saving features and superior technical position and is in great demand in practically all foreign countries. In 1927 these exports totaled nearly $184,000,000, as compared with a value of $87,000,000 in 1913. While Europe continues to absorb a large volume of such machinery it is significant also that the volume absorbed in Latin America and in Asia is increasing rapidly. In Australia and Africa there is a strong tendency to establish manufacturing facilities and undertake important engineering construction, with the result that these regions, formerly considered industrially backward now are developing a certain measure of self-efficiency and coming to occupy a much more important position in the commerce of the world. The accompanying material is from a bulletin prepared by the industrial machinery division of the department of commerce, Washington, to indicate concisely the methods that have been used successfully by a large number of machinery manufacturers in developing their business in foreign countries.

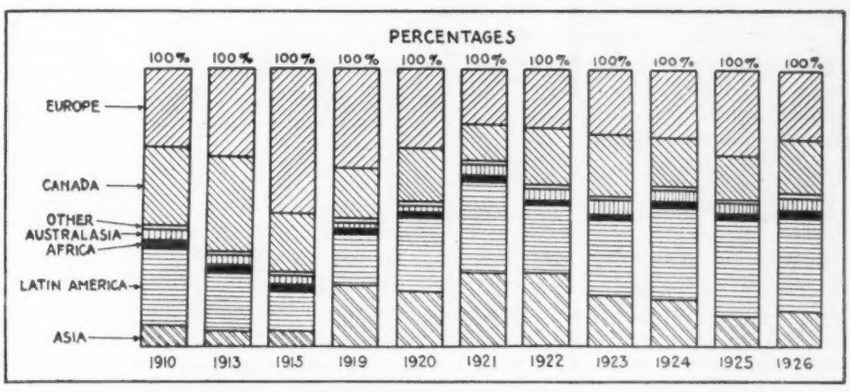


Chart showing changes in destinations of United States industrial machinery exports by percentages

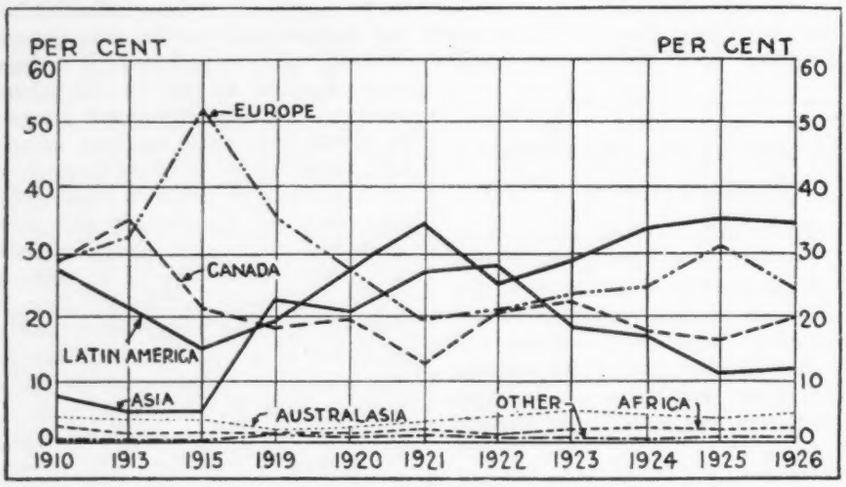


Chart showing changes in trends of United States industrial machinery exports over a period of years

the long run. There have been instances where manufacturers of noncompetitive products have co-operated. By having one man service the equipment of all those in the group, it is possible to reduce costs materially for any one manufacturer and yet give the maximum service to customer and sales representative.

Under general conditions it is not advisable to ship machinery on consignment. Certain cases will arise, however, where the manufacturer has had long experience with his agent or the agent is well known through other sources, when it might be advisable to send a machine of standard type on consignment for demonstration purposes. It is difficult for the average prospective buyer to visualize the operations of a machine from a catalog illustration. If a manufacturer has in the salesroom of his representative a standard machine which can be operated, the salesman is in a much better position to sell to prospective customers than the one who has to offer only catalogs or pictures of the equipment. However, it is realized that in the case of highly specialized machinery of all classes the sale is distinctly limited. Furthermore, on this type of equipment the customer does not expect the salesman or representative to have a machine available, and it would therefore not be advisable to send specialized machinery for demonstration purposes.

Details Require Attention

Success in foreign business involves punctilious attention to a large volume of detail work. Every shipment requires a bill of lading, and insurance policy, an invoice, a packing list, an export declaration, and sometimes a certificate of origin or other consular documents, an agency certificate, or other forms of affidavit—all to meet the requirements of manufacturer, railway, exporter, steamship company, insurance company, bank, importer, customs officials, and erecting superintendent—and a varying number of copies of each of these documents will be needed, according to the country of destination. Omissions and inaccuracies will cause trouble somewhere, usually at destination. Usually, also, they will involve expense. All should have the same mark of identification and the same description, otherwise there may be loss in an insurance or steamship adjustment or a fine in the customhouse.

Dealer Is Held Accountable

The manufacturer who is building a reputation and a future cannot afford to neglect these details, for it should be remembered that European countries are comparatively small, and it is the practice there to follow up the shipment until it is at sea. Americans must expect to be held fully accountable and in quoting for delivery outside the United States must, in fact, arrange for such delivery.

The average American manufacturer does not view the appearance of the machine as critically as a foreign buyer does. For instance, when inspection is made by the average foreign buyer, he looks in the most inconceivable places, such as bearing bushings and supports, to try to find pinholes and blowholes, which in no way weaken the construction or operating efficiency of the equipment but which may serve as a pretext for refusing delivery or trying to obtain a reduction in price. It cannot be too strongly recommended to American manufacturers that they watch this point closely in order to avoid any possibility of complaint or rejection on the part of the foreign buyer. Furthermore, where machines can be given a higher polish and better paint job than is ordinarily done with those for domestic consumption it is well to consider this point. The foreign buyer leans rather strongly to what we term "unnecessary paint and polish," and in many cases the appearance of a machine may tend to increase or decrease the sales resistance encountered.

The industrial machinery division of the bureau of foreign and domestic commerce, Washington, is in a position to co-operate with manufacturers confronted with problems along the lines indicated and will probably be in a position to offer useful suggestions in connection with specific problems.

Copper Is Second Metal in Canada

Copper is the second metal in value of production in Canada, according to a report from Consul H. T. Goodier, Vancouver, made public by the department of commerce, Washington. The dominion's output in 1927 was a little over 4 per cent of the world's total.

Canadian production of copper has grown from 86,881,537 pounds in 1923 to 140,141,823 pounds in 1927, both quantities and values increasing every year until the last, when the value did not keep pace owing to temporary lower prices.

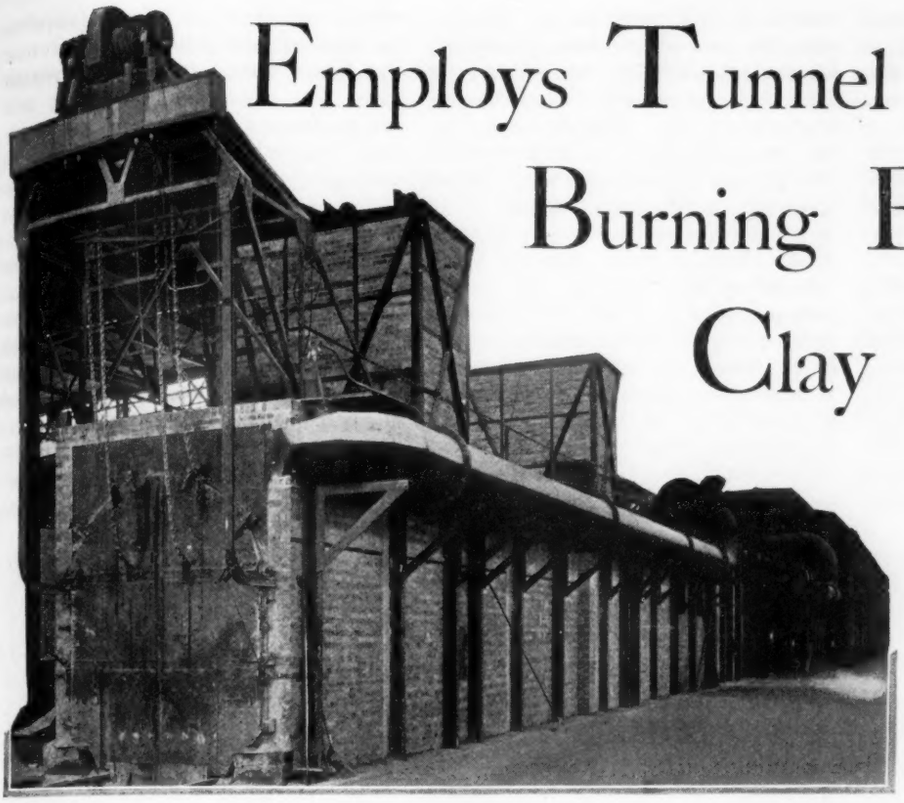
This trend was observable in British Columbia, which ranks second among the mining provinces of Canada, producing one-fourth of the minerals of the entire dominion and 64 per cent of the copper. Its copper output came to 89,108,017 pounds in 1926 and 91,685,843 pounds in 1927. Prices have picked up during the present year, and the 1928 production is expected to reach about 100,000,000 pounds, with a value of nearly $14,000,000.

Rules on Fluorspar Duty

Collector of Customs E. W. Camp, Washington, requested to lay down a method for determining the chemical analysis of fluorspar to determine the duty as increased by the presidental proclamation of Oct. 17, 1928, has advised the collector at New York:

"You are directed to secure from the importer verified commercial samples of each shipment when deemed necessary for the purpose of checking with the commercial analysis upon which the settlement was based."

Employs Tunnel Kilns for Burning Fire and Clay Brick



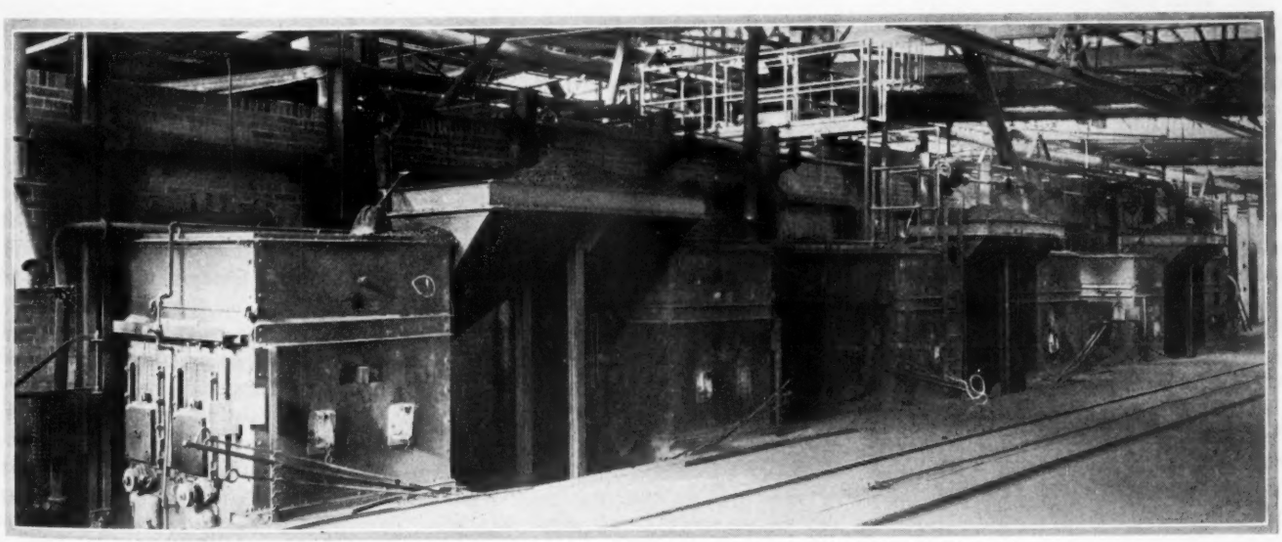
View of tunnel kiln at East Chicago, Ind., taken from the outlet end

By J. B. Pletcher
and
W. G. Gude

METHODS designed to produce a better grade of clay and silica refractory brick in a shorter length of time are incorporated in the improvement program recently completed at a cost of several million dollars by the Harbison-Walker Refractories Co., Pittsburgh, at three of its plants. These plans, at Templeton and Clearfield, Pa., and East Chicago, Ind., have been rebuilt, and the success enjoyed by the new operations indicates that similar improvements will be effected at other plants. Clay brick is produced at the two Pennsylvania plants, which are nearly identical in design, while silica brick is made in East Chicago.

To users of refractory material the chief features of interest in the new manufacturing practices at Clearfield and Templeton are: The system of preparing the clay and pressing the brick, a method designed to give better texture and workmanship, close control over all stages of manufacture, particularly in the burning of the clay; uniformity of the burn obtained, due to the design of the kilns and car tops and to close pyrometric control; and a decrease in time.

Newly-designed equipment installed at these plants in connection with the improved processes includes: Two stoker open-fire tunnel kilns at each plant, built by American Dressler Tunnel Kilns Inc., Cleveland; presses built by Chisholm, Boyd & White Co., Chicago; remodeled grinding, screening and storage units; impact mills and air separators for sizing grog; and wet pans with a new type of disintegrator to prepare clay for the presses. In addition, use is made of such conveniences as electric car pullers, monorails for handling coal and ashes, automatic stokers and a vacuum system for cleaning kiln cars. William



Clay brick kiln at Templeton, Pa., plant. Buckets of coal are brought to the various stoker hoppers by a monorail

Swindell & Bros., Pittsburgh, installed the foundations for kilns and dryers and erected the former at both plants.

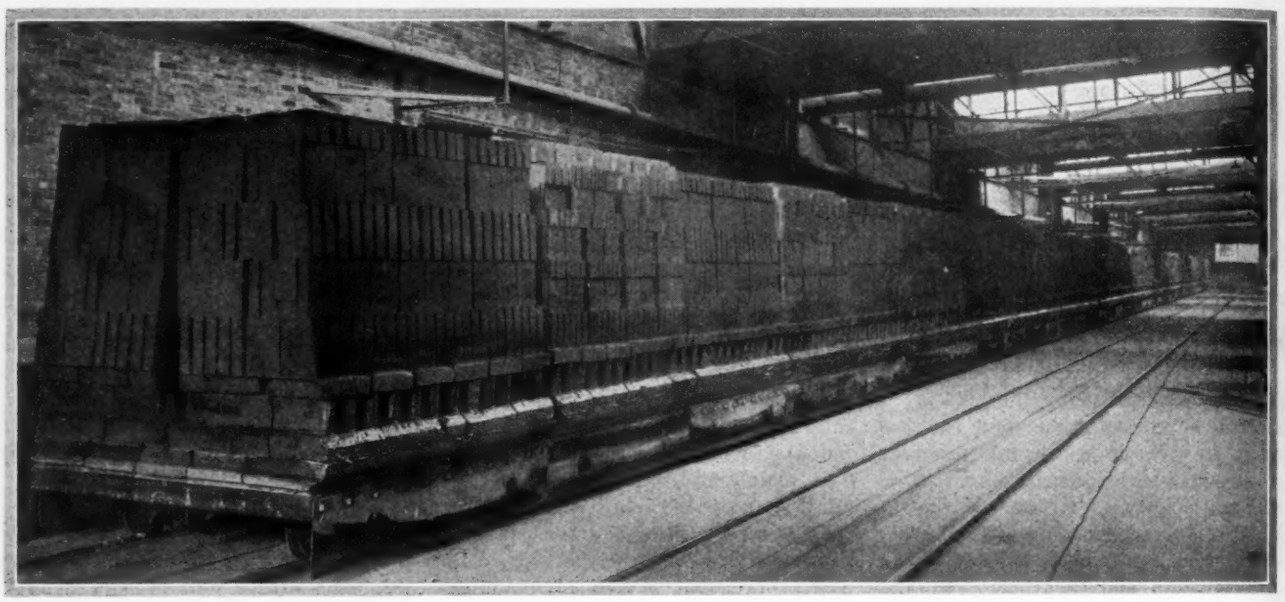
The tunnel kilns, each 444 feet long, occupy the center of interest in a survey of the various processes employed to change the raw materials into finished brick. These kilns, said to be the longest of their type in use anywhere for the firing of clay products, are of the open-fire design, equipped with six automatic stokers on each side. Two kilns are installed at each plant and are built parallel to each other. Approximately 36,000 9-inch brick or their equivalent constitute the daily output of each kiln, although the units were designed for a daily capacity of only 30,000.

taining of uniform brick are the system for providing well distributed heating throughout the charge of brick and the construction of the refractory car tops. The design of the car top lends itself to uniform heat distribution. Channels are formed crosswise on the cars on top of 12 inches of solid refractories by placing girder blocks 8 inches high, at intervals of 4 to 6 inches. Refractory slabs are placed on top of the blocks. These channels extend only to within a few inches of the center, forming a lengthwise channel which is extended upward to the top of the setting in piling the brick.

This arrangement permits hot gases to pass to the center of the car, and

which the brick is placed following its pressing and prior to its entering the kiln. Gases, introduced through flues, heat circulating air passed into the dryers and thus prevent the products of combustion from coming in contact with the ware. In addition, close control of the drying conditions can be maintained.

Similar care is exercised in the preparation and pressing of the clay. At the Templeton plant, the new semi-dry process used in connection with the Boyd-type press is supplemented by the old stiff mud operation and auger machines. This latter department, however, is expected to be superseded by the new method, as at Clearfield. The stiff mud process



Cars of brick that have been burned. Each car holds from 2200 to 2300 9-inch brick or in excess of 8 tons of ware

Coal stokers are of the underfeed type and are arranged for close control of fuel consumption.

An elaborate system is employed for accurately checking temperatures in various parts of the kilns, 12 base-metal and 20 platinum-rhodium thermocouples being installed on each kiln. The base metal couples measure temperatures in the cold zone and the rare metal couples are used in the hot zone. Twelve of the rare metal couples are placed in the fire boxes. Temperatures are read from a central control point, where recording pyrometers also are installed, the pyrometers and switches being so arranged that by merely turning a convenient knob a complete picture of thermal conditions surrounding the brick in its passage through the kilns is obtained. This arrangement permits close control over the temperatures to which the brick is subjected.

Other important factors in the ob-

since the slabs forming the setting floor are set with open spaces between them, these gases are distributed throughout the setting. Heat from the stokers enters the kilns at about the car top level. The location of the firebox openings causes some of the hot gases to pass through the channels formed by the girder blocks and out through the center of the car. The remainder of the gases travels up the sides of the brick. This system of efficient heat distribution produces uniformity of burn throughout the setting and permits the placing of a larger number of brick on each car. It is possible under the present arrangement to load from 2200 to 2300 brick per car, a charge of more than 8 tons of ware. Cooling of the brick is accomplished mainly by drawing air through hollow walls and the crown by an induction fan.

Products of combustion are employed in the drying chambers in

consists of forcing the wet clay by means of screw action through a die in one continuous strip. This strip is sliced up into desired lengths which are edge-pressed on repressing machines. In the new Boyd press installation, a predetermined charge of clay is fed into a revolving pan 8½ feet diameter. Water is added in the exact proportion desired. After thorough mixing, the clay is screened on a belt conveyor which passes it overhead to the power press. The brick automatically is formed and piled by hand on the cars. This system of forming the brick also eliminates laminations frequently found when using the stiff-mud process.

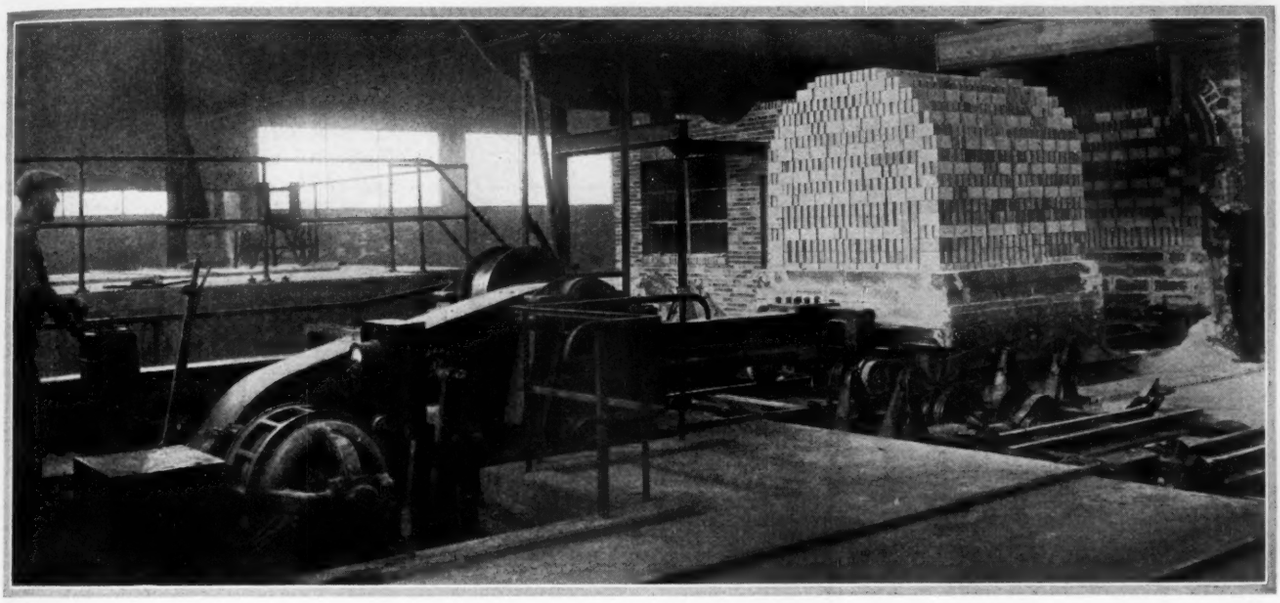
Careful layout of the various equipment aids in eliminating waste motion in the movement of the clay from storage into the mixing pan, from there to the presses, dryers, kilns and finally to the stockroom or railroad cars. Specially-designed elec-

tric transfer cars facilitate the movement of the brick at each end of the kiln room. Kiln cars are moved from the dryers to the kilns by these cars. The burned brick is taken from the kiln, pulled on the transfer cars and moved to the unloading track.

An efficient system is used at Templeton in feeding the stokers. Coal from the company's mines is crushed and hoisted to 50-ton storage bins fitted with hopper bottoms and release gate. The monorail bucket is easily filled by opening the gate. This practice requires the services of only one man in supplying the 24 stokers of the two kilns.

An important feature of the new methods employed at the Templeton company report that already noteworthy improvement has been made in the brick, particularly regarding the uniformity of burn. Every part of the charged load of brick in the kiln is subjected to a uniform temperature under ideal firing conditions.

For the regulation of the tunnel kiln, gas producers, waste-heat and drying equipment, a complete pyrometric and thermal control system has been installed. An instrument room houses numerous instruments of thermal control, included automatic recorders of kiln and waste-heat temperatures and also moisture, volume, flow and pressure meters. The tunnel kiln is fitted with 12 thermocouples at strategic points in the burning, preheating and cooling zones and waste-heat piping system. In addition, numerous orifices in the crown of the kiln permit constant study of heat conditions by optical pyrometers and thermocouples at every stage of the burning. Temperatures are recorded on roll charts in the instrument room, the charts being replaced every 24 hours. In addition, a complete record chart of the burning curve of each car of brick is to be kept for a period of a year. All charts are filed in a glass front roll cabinet, and the record of any car desired can be readily referred to by the simple turning of a knob.



Car of green brick being pushed into tunnel kiln. The electrically operated pusher is shown in the foreground

and Clearfield plants that has been effected is the reduction in time required to produce finished brick from the raw material, while at the same time the output per employe has been increased. This saving, amounting to as much as 50 per cent in actual time over the old process, is a valuable factor in the completion of rush orders.

The new silica brick plant at East Chicago is of special interest in that it is equipped with a type of regenerative tunnel kiln never before used in America. The kiln, designed by Heinrich Koppers, Germany, is in principle a duplicate of one which has been in successful operation for several years at the silica brick plant at Dusseldorf-Heerdt, Germany. It is fired with washed producer gas. The entire plant exclusive of the building was erected by the Koppers Construction Co., Pittsburgh.

Engineers of the Harbison-Walker

The kiln, constructed of structural steel, silica and fireclay brick is approximately 495 feet long and is designed for a 30,000 continuous daily output of 9-inch brick or their equivalent. It consists of preheating, burning and cooling zones approximately 144, 200 and 151 feet long, respectively. There are 15 air and 15 gas regenerator chambers on each side of the burning zone and reversing is accomplished every 20 minutes. A brick-lined piping system connects the regenerators with a brick-lined externally-insulated waste-heat main, structurally supported above the kiln. The inside width of the tunnel is approximately 8 feet and its height from car top level to the crown is a little over 7 feet. The air required for the combustion of the producer gas is drawn from the kiln room by a fan which is mounted on top of the tunnel kiln.

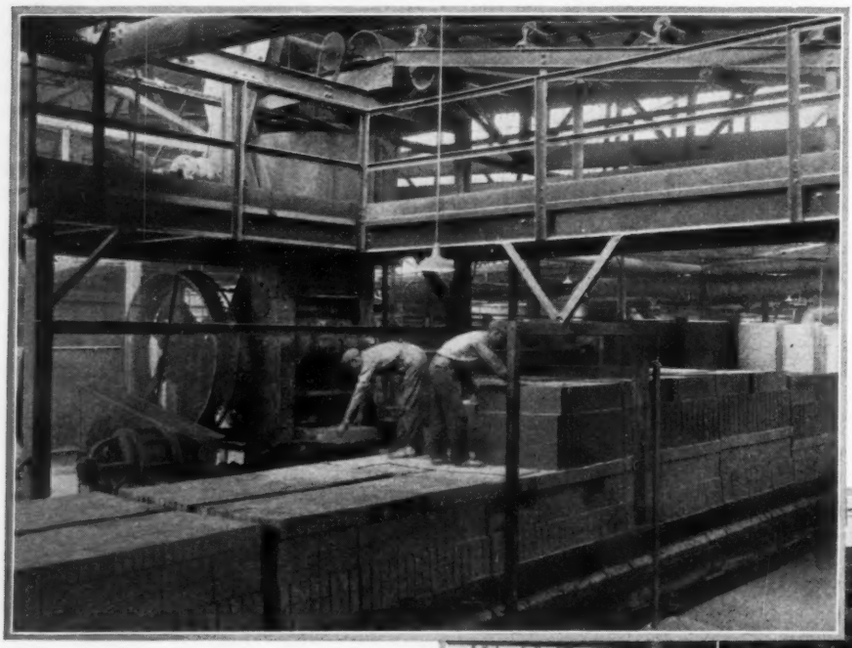
Beneath the kiln, running its full length, is a concrete-lined passageway sufficiently wide to enable the kiln operators to traverse its length. In this passageway directly under the burning zone are two piping systems through which heated air is exhausted by fans mounted on top of the kiln. A circulation thereby is established to cool the car bottoms and bearings. The hot air from one of these systems is exhausted to the atmosphere while that of the other is blown into the kiln at the discharge end, where with proper regulation it serves to maintain in the cooling zone a cooling curve corresponding closely with the desired theoretical curve as determined by best practice.

Hot gases in regulated quantities are withdrawn at several points in the cooling zone through pipes connected to the waste gas piping system. At the inlet end of the kiln a fan-type exhauster draws a regulated quantity of waste gases from the kiln and discharges them through a stack to the atmosphere. This fan serves to main-

tain the desired heating curve in the preheating zone.

The waste gases, except for the small quantity exhausted at the inlet end, are withdrawn through the waste-heat system and delivered under pressure to the brick dryer. Uniformity of operating conditions in the kiln and dryer are aided by the exact control of all gas and air pressures.

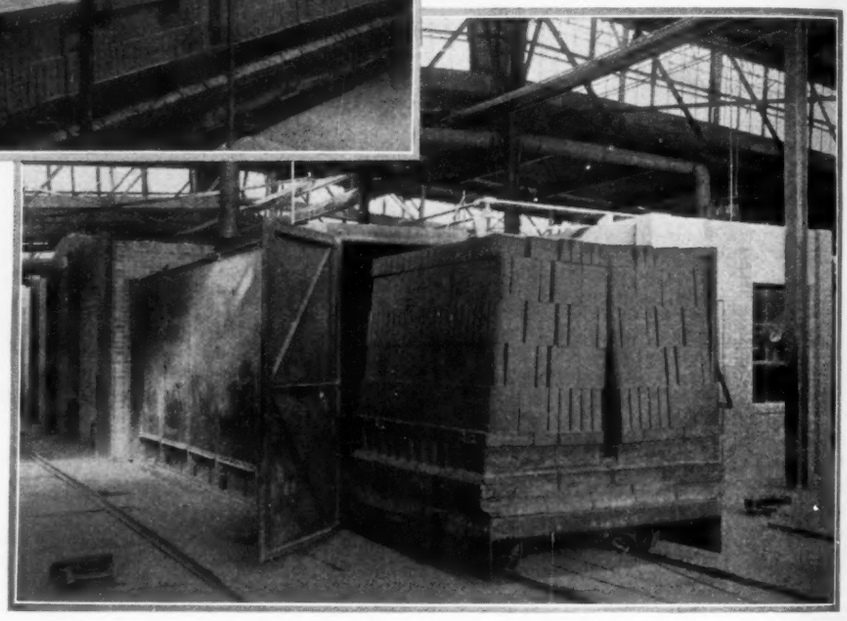
At each side of the kiln, immediately preceding the burning zone, a preheating chamber equipped with producer gas burner of special design is provided. This serves for the initial heating of the kiln and later in regular operation to supply such heat as is necessary to maintain a proper heat balance in the preheating zone.



Loading brick from the molding machine on cars going to the dryer and kiln. Conveyor serving hopper is shown above

To fill the kiln 61 cars are required. They are charged through electrically-operated doors by a mechanical pusher, at the rate of one car every 3 hours. A second and third kiln of the same type to be built later will increase the total daily output to 90,000 or 100,000 brick, 7 days per week. The completed kiln, the one now under construction, and the spacious storage and shipping areas, including the kiln brick-setting area, are all under one roof, in a steel-concrete structure 720 feet long and 258 feet wide.

From the waste-gas main over the dryer, connections lead downward into the individual dryer compartments, in which temperatures definitely are controlled by the admission of cold air. Each compartment is equipped with a thermocouple connected to a multiple recording instrument. The waste gases, cooled to the proper temperature, come directly in contact with the brick to be dried. A fan-type exhauster withdraws the moisture-laden waste gases from the dryer and discharges them through a stack to the atmosphere. The dryers are operated at a temperature of 350 to 400 degrees Fahr. Nine-inch brick are dried in about 24 hours, while larger shapes take a somewhat longer drying time.



Carload of clay brick leaving kiln. The cars later are spotted for setting and unloading by an electric locomotive

An electric locomotive transports the kiln cars from one end of the building to the other and spots them for setting and unloading. At each end of the kiln room an electric transfer car serves for lateral movement of cars. The loaded cars are charged into the kiln by an electrically-operated mechanical pusher or ram.

New storage bins for silica rock have been built adjacent to a steel and concrete trestle. The rock is dumped from hopper bottom cars and fed to a crusher which reduces it to about 2-inch ring size. The crushed rock is elevated to the storage bins. The grinding, mixing and screening unit has been completely modernized. Conveyors transport the crushed rock to the five wet pans for grinding.

An important innovation is the use of a type of silica brickmaking machine never before used in this country, and having a capacity of 15,000 9-inch brick in eight hours.

The molded brick are set on pallets or trays which are placed upon rack cars. These are pushed into the dryer at one end and withdrawn at the other. From the rack cars, the dried brick are set on the cars which go through the tunnel kiln.

On each car are set four thousand 9-inch brick in 12 layers, eight brick wide and about 6½ feet high. This imposes a much lighter average load on the brick than is customary in periodic kilns, where the brick usually are stacked to a height of about 15 feet. As a result of the light load and of the method of setting, the expansion of the brick, which takes place in the burning process, does not produce heavy stresses. The brick, therefore, are uniform in size and have true edges.

During the entire manufacturing process, the brick do not pass out of the building which houses the kiln and the storage and setting areas. The storage space for burned brick is 76 by 600 feet.

Tracks of the Indiana Harbor Belt Line and the Elgin, Joliet & Eastern railroads run directly into the shipping space. The concrete shipping

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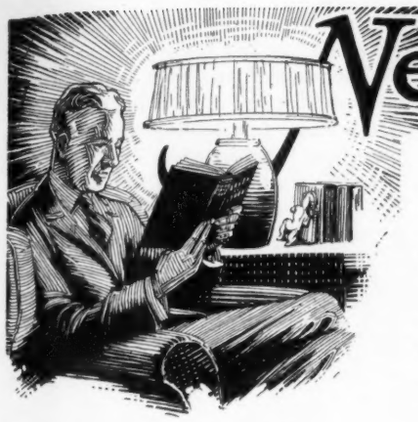


New Books Worth Reading

How Impurities Affect Metals

Impurities in Metals, by Colin J. Smithells; cloth; 157 pages 6¼ x 9¾ inches; published by John Wiley & Sons Inc., New York, and supplied by IRON TRADE REVIEW for $5, net, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for £1 5s, net.

Little attention has been paid to small quantities of foreign substances usually present in metals and their action on the various properties of metals and alloys. It has become apparent that important influences often are exerted by small quantities of impurities. Preparation of spectroscopically pure metals has revealed unusual properties previously unknown because of the effects of foreign substances. Removal of these impurities is a matter of cost related to the results attained in the pure metals.

Whether it is commercially advisable to obtain the pure metal or whether it is not worth while in view of the cost, knowledge of the influence of the adulteration is valuable to the metallurgist. It is to this end this volume is directed. Ample illustrations, mostly photomicrographs, serve to make clear the text.

* * *

Guide to Oil Heating

Handbook of Domestic Oil Heating, by Harry F. Tapp; first edition; cloth, 383 pages, 4¼ x 7¼ inches; published by American Oil Burner association, New York; supplied by IRON TRADE REVIEW for $3, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for 15s, net.

Since domestic heating has passed from guesswork to an exact science this handbook brings a wealth of information. Definitions of words and terms used in heating and ventilating practice, oil technology and oil burning are defined as a foundation for understanding reading of the book. Tables and charts add illumination to the text. A history of the use of oil as a fuel is sketched, with an account of petroleum production, refining and handling.

Various types of oil burners and controls are described and analyzed, as a guide to engineers and users in choosing the unit best adapted to a given use. Three chapters are devoted to boilers and furnaces and various types of heating systems. The principles and characteristics of each type are described and illustrated by line drawings.

A model ordinance to guide city officials, data for architects with specification form, revised regulation of the board of underwriters, steam tables, suggestions for inspection and survey of heating plants, these are some of the subjects covered.

* * *

Tax Shifting Considered

Shifting and Effects of the Federal Corporation Income Tax, Vol. I, manufacturing and mercantile corporations; by the National Industrial Conference Board Inc. New York; cloth, 251 pages, 6 x 9 inches; supplied by IRON TRADE REVIEW for $4, postpaid and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for £1, net.

Many questions coming up under the corporation income tax law are discussed in this volume. The possibility of shifting the federal corporation income tax from the manufacturer to the consumer is considered. Analysis of the sales, profits and capital investment of 4644 large and successful corporations from 1918 to 1925 forms the basis of the study. The opinions of more than 1000 corporation executives on the possibility and practice of shifting the tax to the consumer are analyzed.

This study has been made in cooperation with a joint congressional committee and the treasury department. A second volume will carry consideration of these subjects further.

* * *

Management in Manufacturing

Laws of Management Applied to Manufacturing, by L. P. Alford; cloth, 266 pages, 5¾ x 8¼ inches; published by the Ronald Press Co., New York, and supplied by IRON TRADE REVIEW for $4, postpaid, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for £1, net.

Some 50 laws of management underlying successful manufacturing are summarized in this volume, with a number of examples from the practice of well known manufacturing organizations. The author was awarded the Melville medal by the American Society of Mechanical Engineers as a result of the research work on which it is based.

The executive will find it a guide to fundamentals in his search for light on the innumerable variations of methods in manufacturing. Technical terms have been omitted as far as possible, to make it understandable to the average reader who may not be familiar with them. It presents the improvements, betterments, gains and savings which have resulted from application of the laws to manufacturing.

* * *

What Metal Experts Say

Proceedings of Institute of Metals, 1928; published by the American Institute of Mining and Metallurgical Engineers; 836 pages, 6 x 9 inches, cloth; supplied by IRON TRADE REVIEW for $6, postpaid, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for 30s, net.

Papers presented before the Institute of Metals at Detroit and New York meetings in 1928 make up this volume. It is the second of a series constituting the official proceedings of this division and deals with nonferrous metals. This series is a continuation of previous publications, started in 1908 and appearing under various titles.

To metallurgists and engineers interested in various problems now under investigation these papers furnish information of late research in the nonferrous field. The papers are given in full and stenographic report of the resulting discussion of each follows. Numerous illustrations supplement the text and a comprehensive index aids in reference to details.

* * *

Standards in the Making

A. S. T. M. Tentative Standards, 1928, by the American Society for Testing Materials; paper or cloth, 932 pages, 6 x 9 inches; published by the society and supplied by IRON TRADE REVIEW for $7 in paper and $8 in cloth, and in Europe by Penton Publishing Co. Ltd., Caxton House, London, for £1 15s and £2, net, respectively.

An annual publication, this volume presents 22 standards relating to ferrous metals, 17 relating to nonferrous metals, seven for coal and coke and numerous others in other classes of substances.

These tentative standards are printed

one or more years to allow consideration and amendment, before becoming accepted standards for general use. Formal action by the society after this period of probation gives the standard the effect of approval by the industry.

* * *

Plant Cafeterias a Loss or Gain?

Industrial Lunch Room, paper, 65 pages, 6 x 9 inches; published by National Industrial Conference board, Inc., 247 Park avenue, New York, and supplied by IRON TRADE REVIEW for $1.

This booklet contains the report of the National Industrial Conference board on an investigation of lunch rooms and cafeterias in 200 industrial plants. It tells how to ascertain the demand and type; describes various types; gives numerous plan views; outlines the management of lunch rooms and their costs. The booklet also contains a list of representative company operating lunch rooms, and a manual of operation.

According to the board the majority of company lunch rooms are being operated at a financial loss. Out of 200 which reported only 26 showed a profit; 33 covered expenses, three made no charge for food or service and the remaining 134 operated a loss. The analysis, however, indicates that the advantages gained indirectly may outweigh disadvantages.

Uses Tunnel Kilns for Burning Brick

(*Concluded from Page* 1620)

platforms are at railroad car door level.

A modern gas producer plant of two gasifying units joined to a common washer furnishes gas for the tunnel kiln. Each producer is capable of gasifying 35 tons of coke a day. The producers are water jacketed, which makes them self-contained units, as sufficient steam is generated in the jackets for the gasmaking process with a considerable surplus for heating purposes. The temperature of the mixture of steam and air in the blast is controlled definitely. Temperature recorders and pressure gages afford the operator a quick survey of conditions in all parts of the producer plant. A steel-concrete building houses the entire equipment including producers, air compressor, pumps, skip hoist and storage bins.

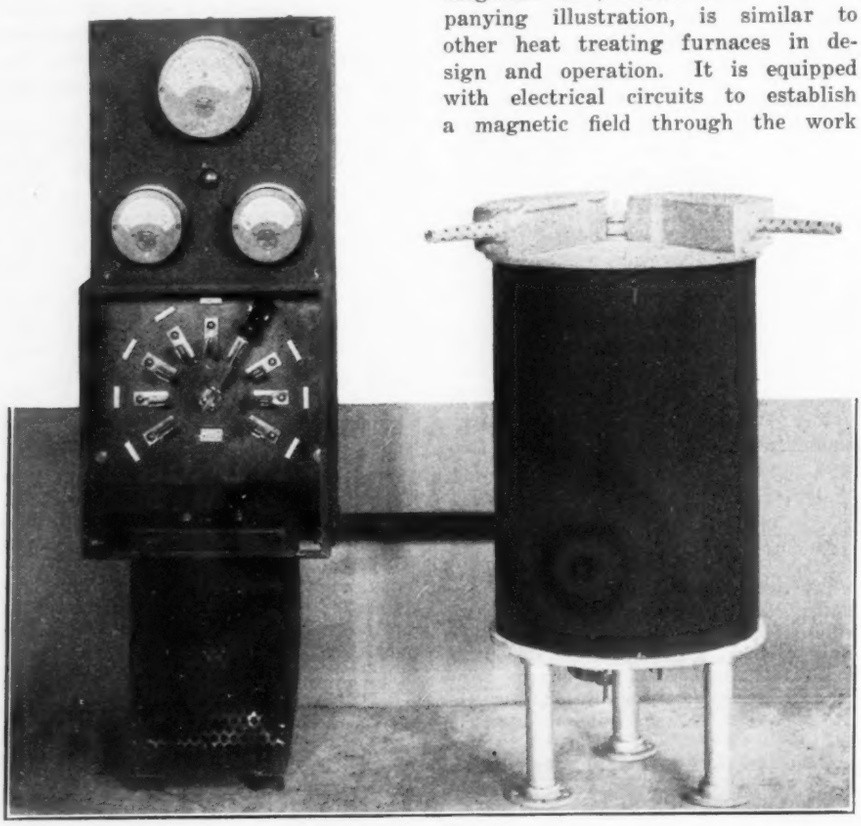
A laboratory has been installed and equipped for both chemical and physical testing. Chemical analyses of raw materials, screen analyses of the ground mixtures, determination of lime and moisture contents in the prepared mud, chemical analyses of the finished brick and tests to determine the specific gravity and porosity of the finished brick are all included in a control method which ensures scientific uniformity of the product.

Will Hold "Open House"

The Polytechnic Institute of Brooklyn, N. Y., announces it will stage its annual "open house" Jan. 11, between 4:30 and 10 p. m., at which time its laboratories and shops will be in operation and student guides will conduct visitors through the building.

Critical Temperature of Steel Is Indicated Magnetically

A HARDENING furnace, which indicates the critical point of steel magnetically is a new development of the Hevi Duty Electric Co., Milwaukee. The electromagnetic unit, shown in the accompanying illustration, is similar to other heat treating furnaces in design and operation. It is equipped with electrical circuits to establish a magnetic field through the work and a meter to measure the strength of this field. The circuits are so arranged that no deflection of the needle occurs with the furnace empty, but when steel is placed on the hearth the meter immediately indicates an increase in the strength of the field caused by the magnetic properties of the steel.

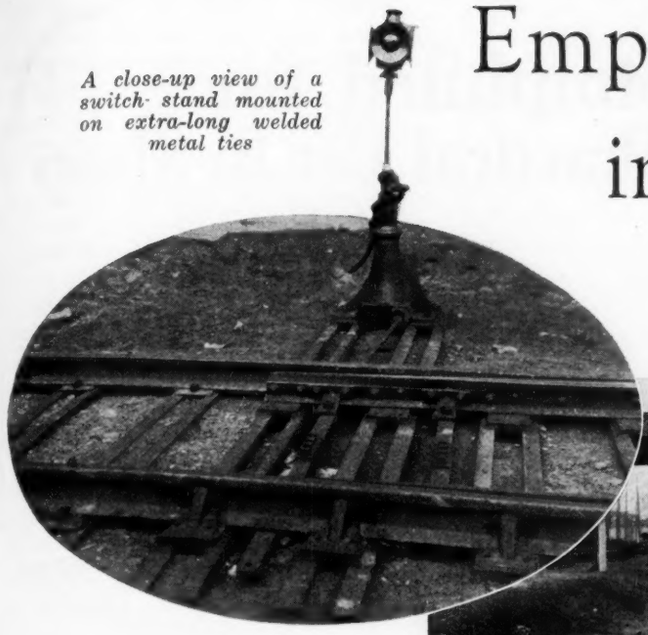


Electro-magnetic unit which indicates the critical point of steel

This method of heat treating is adapted to all straight carbon steels of more than 0.4 per cent carbon, and alloy steels whose critical temperature is below the safe working limits of the furnace. These include most of the usual tool steels with the exception of those of high-speed quality. The use of this type furnace makes for accurate duplication of results, maximum hardness and determines an exact point from which further processes may be conducted. As the magnetic function is independent of the furnace temperature, maximum production can be obtained.

Another development of this company is a pot for cyanide and lead hardening furnaces which is built with corrugations to provide about 30 per cent more heat releasing and receiving surface than a straight side pot of equal holding capacity. The corrugations also establish sufficient pinch effect in the material to secure a stirring action. This insures uniform distribution of temperature and conducts the heat from the walls rapidly, producing efficient operation.

Employs Steel Ties in Switches and Crossovers



A close-up view of a switch stand mounted on extra-long welded metal ties

General view of Delaware & Hudson siding into General Electric Co. plant at Schenectady, N. Y. All-metal ties are employed. Single ties across both sections of track are shown

ANOTHER stimulus to the use of metal railroad ties has been provided by the Delaware & Hudson railroad as a result of its application of welded metal ties to switches and cross-overs. This company recently has completed the rearrangement of the spur which connects its main freight line with the plant of the General Electric Co. at Schenectady, N. Y., and all the ties laid were of the metal variety.

The feasibility of metal ties was suggested by William Dalton of the General Electric Co. early in 1927, and at the same time it was announced that the company had designed automatic welding machinery which could produce metal ties at a low overall cost. A description of the tie appeared on Page 901 of April 7, 1927 issue of IRON TRADE REVIEW, while the equipment was described on Page 1358 of the Dec. 1, 1927 issue. The Delaware & Hudson railroad pioneered in the new field by installing machinery at its Colonie, N. Y., shops for welding metal ties, and by installing a section of track in its freight yards at that point utilizing welded metal ties fabricated from worn rails.

Until recently, however, such ties had been used on straight track only. The installation at the General Electric plant at Schenectady includes all types of track which are commonly used in railroad service, with the exception of track involving the signaling function on which developmental work is now in progress. Not only were the switches and crossovers mounted on metal ties, but the switch stands themselves were mounted on extra long metal ties. By a simple arrangement the base on which a switch stand is fastened is welded to the ties resulting in a firmly fastened stand, but allowing its easy removal for replacement or repair if necessary.

For this special construction, scrap rails, cut to the proper lengths, were delivered on the spot and there welded by hand and installed under the track. The railroad crew foreman in charge of the installation claimed that not only was the work simplified with the metal tie, but that he could do a much better job with more permanent, beneficial results.

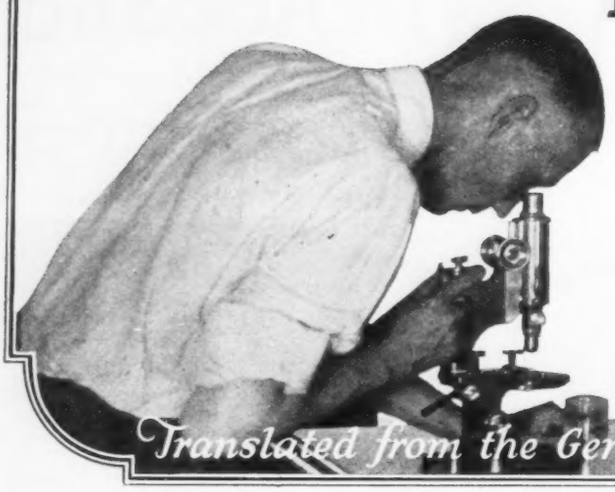
A particularly advantageous consideration, it was found, developed in connection with the installation of the crossovers. Where one track left another at a switch, metal ties of greater length were used, a single tie being common to both sets of track for quite a distance from the switch. It is believed by Delaware & Hudson experts that this affords an important saving over the cost covering a similar practice using wooden ties. The value of using single ties common to both sets of track in such applications lies in the stabilizing effect at a point subjected to particularly heavy stresses, thus tending to provide a firm, strong switch with no tendency to weave or tilt out of position.

The Delaware & Hudson's metal tie fabricating shop at Colonie, N. Y., is built around an automatic arc welding machine designed and built by the General Electric Co. Its present output is about 20,000 ties per year, a production which is entirely covered by requisitions from the various operating divisions. Metal ties are now considered standard by this railroad for everything except signal track.

Plan Exhibit in May

The twelfth exposition of the chemical industries will be held at the Grand Central Palace, New York, May 6 to 11, 1929. Among the many industries to be represented at this exhibit will be by-products and coke ovens, gas and public utility companies, metallurgical and mining industries and chemical and engineering equipment manufacturers.

Metallography Simplified for Practical Use In Shop



By
E. Preuss
G. Berndt
M. v. Schwarz

Translated from the German by Richard Rimbach

Chap. IX—Hardened Steel

AUSTENITE in the form of a solid solution occurring in the constitutional field IV of Figs. 79 and 80 cannot be shown in the usual way since, due to the high temperature (721-1528 degrees Cent.), it is impossible to make polished sections of the steel to etch and examine under the microscope. Although the austenite, when cooled slowly, changes into ferrite and pearlite, when cooled quickly, as in water quenching, practically no time exists for this change, which means that the solid solution remains even at room temperature. So far it has not been possible, even with extremely rapid quenching, to obtain pure austenite in ordinary iron-carbon alloys, but it can be obtained in high-nickel steel, as here its disintegration is retarded strongly. As shown in Fig. 93, the structure then consists of uniformly roughened light surfaces, which often show twin formation and, contrary to ferrite, mostly rectilinear borders. Austenite is a comparatively soft material. The speed of transformation also is retarded strongly by higher contents of manganese and the temperature of transformation is reduced below room temperature to such a degree that even with the slowest cooling manganese-hard steel containing about 12 per cent manganese remains in the austenitic state and cannot be "annealed soft." Fig. 100 shows the characteristic polyhedral structure of an austenite manganese-hard steel.

In ordinary iron-carbon alloys, another constituent in the shape of pointed needles always is formed, either alone or in addition to the other. This material has been named martensite in honor of the former director of the German government bureau of testing materials, and founder of metallography in Germany, A. von Martens. It can be seen clearly beside the austenite in Fig. 96, which is a polished section of steel with 1.57 per cent carbon, quenched from 1350 degrees Cent. in cold water. If the quenching temperature is chosen lower, but always above the temperature shown by lines GS and SE for the respective carbon contents, all the austenite is transformed into martensite, the needles of which will be the finer, the lower the temperature is taken, within certain limits. This is shown in Fig. 94, a photomicrograph of steel

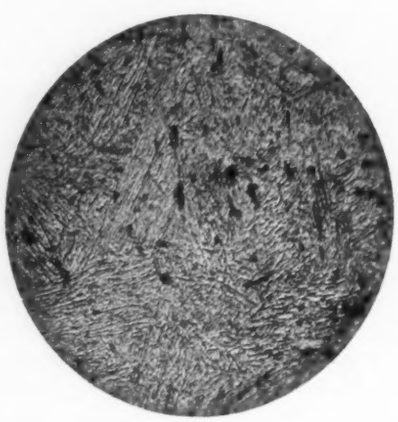


Fig. 93 (Left)—Quenched steel with 25 per cent nickel. Structure is austenite. X 125. Fig. 94 (Center)—Low carbon steel quenched from 1000 degrees Cent. Structure is unsaturated martensite. X 350. Fig. 95 (Right)—Low carbon steel quenched from 750 degrees Cent. Structure is ferrite and martensite. X 350 All samples etched microscopically

with low carbon content quenched from 1000 degrees Cent. The question as to the nature of the martensite was in dispute for a long time. According to results of X-ray investigations it is assumed that the carbon in martensite is disseminated in atomically dispersed form in the space lattice of the alpha iron. A constrained state of the space lattice thus is brought about which produces the glass hardness of the martensite[15]. The fact remains independent of all theory that when steel is quenched in water from a temperature located in field IV of Figs. 79 and 80 needle shaped martensite is formed which is a hard component and therefore constitutes the characteristic structure of hardened steel. As with austenite its content of carbon can be between 0 and 1.7 per cent.

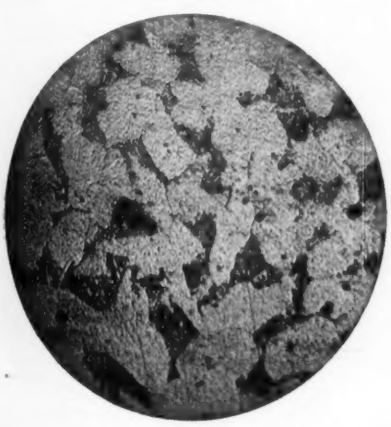
Fig. 96—Tool steel with 1.57 per cent carbon, quenched from 1350 degrees Cent. in water at 5 degrees Cent. Structure is coarse martensite needles in austenite. Etched microscopically. X 350

Further Effect Considered

It might be asked what will happen if the quenching is effected below the lines GS, SE of the diagram in Figs. 79 and 80 but still within the fields VI and VII. In the first two, according to what has been explained before, ferrite and austenite exist side by side. The ferrite precipitated here undergoes no change by the sudden quenching while the austenite again is transformed into martensite. The structure of a steel of about 0.1 per cent carbon content, quenched from 750 degrees Cent. must, therefore, consist of ferrite and martensite, as Fig. 95 also shows; it was produced in a piece of the same steel which is shown in Fig. 94. If, however, quenching is carried from below the eutectoid temperature of 721 degrees Cent., only that normal structure of ferrite and pearlite which always exists at that temperature can be maintained, as is seen in Fig. 97, which also is the steel mentioned above. The same piece of steel can, therefore, according to the temperature at which it is quenched, show a completely different structure. Inversely, a conclusion can be drawn from the structure as to the heat treatment. If a hypoeutectoid steel shows only ferrite and pearlite, it has been cooled slowly and quenched at a temperature below 721 degrees Cent. If, in addition to ferrite, martensite takes the place of pearlite, the quenching temperature was between 721 degrees Cent. and that determined by the aforementioned line GS, while for pure martensite, the quenching must have been at a temperature above that. A further indication as to the temperature is given by the more or less greater degree of fineness of the martensite needles since, as mentioned before, the needles become coarser as the quenching temperature is raised as may be seen by comparing Figs. 94 and 96. For hypereutectoid alloys, the phenomena are quite similar, only cementite takes the place of the ferrite. Fig. 98 shows a steel with about 1.5 per cent carbon which has been quenched at 900 degrees Cent. This steel can be recognized as being hypereutectoid by the existence of almost round islands of cementite beside the martensite.

If, therefore, it is desired to harden a steel so that its normal structure is transformed into martensite, it must be heated above the critical point Ac_3 determined by the carbon content. The time of heating must be at least several minutes as otherwise the time is not sufficient for the reformation of the homogeneous solid solution of ferrite (or cementite) and pearlite which are the bases of the formation of martensite. If the time was not sufficient, ferrite (or cementite in the hypereutectoid steels) will exist in addition to martensite, and the same structure is obtained as when quenching from a temperature within the areas VI and VII of Figs. 79 and 80. Thus Fig. 99 shows a steel with 0.9 per cent carbon which had

[15]Attention is called to the comprehensive article on martensite by H. Hanemann and A. Schrader, Werkstoffbericht No. 61 of the Verein Deutscher Eisenhuettenleute, Dusseldorf, 1925.



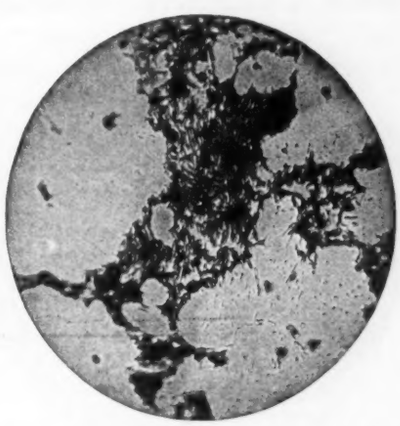


Fig. 97 (Left)—Low carbon steel quenched below 721 degrees Cent. Structure is ferrite and pearlite. X 350. Fig. 98 (Center)—Steel with 1.5 per cent carbon quenched from 900 degrees Cent. Structure is cementite and martensite. X 450. Fig. 99 (Right)—Steel with 0.9 per cent carbon time quenched from 750 degrees Cent. after insufficient heating. Structure is pearlite and martensite. X 830. All samples etched microscopically

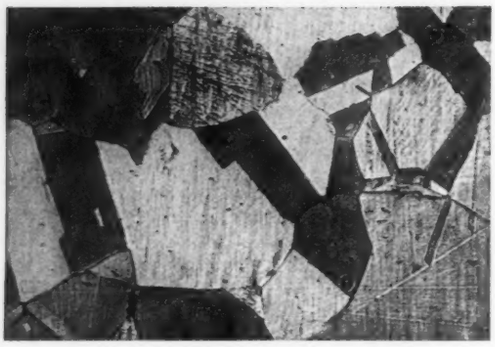


Fig. 100—Manganese steel with a manganese content of about 12 per cent. Structure is polyhedral crystal grains of austensite. Etched microscopically. X 150

been heated for too short a time at 750 degrees Cent. and then quenched in water; consequently, part of the pearlite still exists, as can be seen clearly in the center of the illustration, while the rest has been transformed into martensite.

By quenching from a temperature within the area IV the structure of every iron-carbon alloy can be transformed completely into martensite. Since low carbon steels require a high quenching temperature, they have a coarse martensitic structure and consequently result softer than steels with higher carbon content; this is proved by hardness tests of M. von Schwarz[16] on a Mannesmann tube with 0.33 per cent carbon, the brinell hardness of which was increased from 133 to 380 by quenching from 950 degrees Cent. Similar relations also exist for hypereutectoid forging steels as the quenching temperature rises sharply with increasing carbon content. On account of the coarse grain at these temperatures steels which have a strong inclination to become brittle would be spoiled. However, with hypereutectoid steels it is not necessary to bring the cementite into solution because it already possesses considerable hardness in comparison with the soft ferrite of the hypoeutectoid steels. It is, therefore, quite sufficient to quench hypereutectoid steels from temperatures a little above the pearlite line or from about 730 to 740 degrees Cent.

[16]M. von Schwarz, Zeitschrift fuer Metallkunde, Vol. 12, No. 1, 1920.

Surplus of Serviceable Cars Increases

Class I railroads on Dec. 8 had 256,995 surplus freight cars in good repair and immediately available for service, the car service division of the American Railway association states. This was an increase of 34,456 cars compared with Nov. 30, at which time there were 222,539 cars.

Surplus coal cars on Dec. 8 totaled 97,347, an increase of 21,548 within approximately a week while surplus box cars totaled 115,927, an increase of 11,655 for the same period.

Reports also showed 23,366 surplus stock cars, an increase of 126 cars over the number reported on Nov. 30, while surplus refrigerator cars totaled 9442, an increase of 462 for the same period.

Process Cleanses Open-Hearth Heats

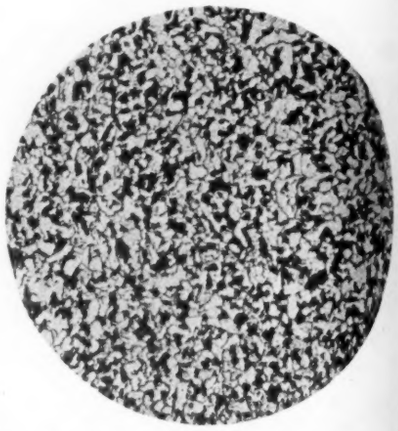
CLEANSING carbon steels and improving their physical properties by a process controlled by the Refined Steel Co., Pittsburgh, is claimed to result in an increase in tensile strength and ductility. A large part of the material used in the refinement of carbon steels is finely divided carbon, an amount being added to a 120-ton basic open-hearth heat of steel to ordinarily raise its carbon content 10 points. But upon subsequent analysis of the steel it is found there is no increase in the carbon content. This is due, it is believed, to a chemical reaction brought about by certain other ingredients in the compound which produce a new compound of carbon, C_2O_2, of which little is known.

In the refining of carbon steels there is no change in the melting practice up to the point of tapping the heat. The refining material is added in 5-pound lots as the steel flows from the furnace to the ladle. The reaction is a violent ebullition of the bath. The temperature is increased and there is a marked difference in the fluidity of the steel and slag and in the appearance of the steel both as to its grain structure and its sheen.

A variation of the refining material is made according to the scrap and outside conditions of the various plants. It has been found by increasing the percentage of pig iron or hot metal an increase in the physical properties of the steel is noticeable. In some instances where the hot metal or pig iron has been 50 per cent of the charge the elastic ratio has been increased materially.

By refining carbon steels elastic ratios have been obtained as high as 80 per cent of the ultimate. Brinell hardness and physical properties of carbon steels in the refined state are comparable with those of certain nickel and other alloy steels. According to prominent research engineers there is a marked difference between the pearlitic structure of refined and unrefined steels of the same carbon content, although there is no increase in the carbon content. Reports indicate that in view of the absence of the hot metal from the heat the refining material acts directly on the ferrite in the steel.

Photomicrograph of a carbon steel in the refined state



Photomicrograph of a carbon steel in the unrefined state

Editorials

1928 Leaves Few Regrets

NINETEEN twenty-eight is a year whose passing the iron and steel industry can sincerely regret. By no means has it been a perfect year, but the preponderance of developments favorable to the industry has been so great that, unlike some recent years, there will be no speedy desire to turn from it and hope for better.

For the industry as a whole, it can be said that its morale recovered appreciably in 1928. The group consciousness of the industry was heightened and a slight inferiority complex, resulting not unnaturally from the excess superiority complex displayed by some of the industry's more important consuming outlets, was erased by the rising prices in the closing months of the year.

Merchant pig iron producers saw their chief competitors—the steelworks—withdraw from their markets to a heartening extent. Not all iron and steel scrap interests were in position to make the most out of the 1928 bulge in scrap, yet the stronger market was a general influence for good. By-product coke held steady, steadiness being a characteristic of this market, while beehive coke gave less price ground than usual in the face of its competing influences.

A display of solidarity, one of the best displays of its kind since the war, enabled producers of heavy steel to stage a real recovery in prices in 1928. If they can repeat the performance in 1929 they will attain a level that is truly warranted, without being inimical to the consumers dependent upon them. It is undoubtedly true that a stiff raw material price enables secondary interests to obtain even more, relatively, for their own product. Sheet steelmakers can count the reduction in their cash discount to one-half of 1 per cent as a genuine accomplishment.

The start made by makers of wire products to put quotations on a dealer-trade rather than a jobber basis encouraged them. Hot strip on two bases is better than on three, and gives the impetus for a single base in 1929. The differential basis on which alloy steelmakers have placed their product is a step forward. For most other products there were few, if any, changes, and in view of the pressure of recent years, inaction might be considered preferable.

So, the industry heads into 1929, inspirited by the experiences of the past year, with a lighter heart than at any year-end in a decade, rightfully expecting better things ahead.

Unity Abroad Insures Profits

FROM Europe at this season come numerous reports of a phenomenon—to the American business man—of which the following is typical: "Because world demand for iron ore is good and prices are satisfactory, producers in France, North Africa and Spain generally hold that it now is advantageous to conclude the proposed cartel of producers selling to export trades."

The spirit of the American producer of iron and steel who has had a good year in tonnage and made some progress toward putting his prices on a more remunerative basis, waxes heavy. In Europe there is governmental blessing to proposals to restrict production and to hold up prices; in the United States concerted action, except for the export trade under certain restrictions, is certain to arouse governmental wrath.

The continental steel entente has just extended its quotas. German wire rope manufacturers are forming a cartel to control sales to the Baltic countries. Welsh tin plate mills are shutting down for specified periods to prevent overproduction. Recently American exporters of tin plate arrived at a world agreement with their competitors, and now somewhat the same situation is being arrived at in tubes. It is scarcely probable, however, that the American antitrust laws will be ameliorated; indeed, some notable authorities advise against any tampering.

Britain Broadens Steel Use

DETERMINATION of British business to use steel more largely, signalized by general plans to substitute steel for wooden cars, for freight and passenger service, seems to be rational. It is buttressed to some extent by another factor, a desire to buy as much material from domestic producers as possible.

A further step in this direction is an order for a heavy tonnage of steel sleepers, railroad ties, for use by one of the lines. The steel ties are cheaper and are produced at home and aid the domestic steel industry. Wooden ties, heretofore universally used, are imported and have been mounting in cost in recent years.

The movement in Great Britain to increase the use of steel is not of the breadth outlined recently by French steelmakers to increase domestic use of their products, but it is having the same effect in a few directions. It is not pioneering, as steel ties have been used on colonial roads with which

British engineers are familiar. Steel for mine props is also making headway in Britain.

Successive Record Years Possible

THOSE seers who with fearless audacity forecast conditions months ahead are practically agreed that the momentum of 1928 assures good business in steel through the early months of 1929, if not promising the start toward another record output. This, like the proverbial overexpectation concerning the clergyman's son, needlessly puts 1929 under a handicap; yet there are numerous instances to sustain hopes of two successive record years.

Going back 28 years to the turn of the century, 1901 set a high steel output record, to be followed by another in 1902. Similarly, 1905 and 1906, 1909 and 1910, and 1912 and 1913, were coupled together. Then, under the impetus of the war came the triple record years of 1915, 1916 and 1917. Not until 1925 and 1926 did record marks again come like policemen. So there is precedent for 1929 robbing 1928 very speedily of its glory.

It requires a perspective of the industry to appreciate what 1928's record ingot production implies. Without including electric or crucible steel, the year's total is estimated at 49,758,000 gross tons, an average of practically 4,150,000 tons monthly. Not until 1890 was so much steel made in any complete year. It was 1899 before 10,000,000 tons was made in one year, and 1905 before the 20,000,000-ton mark was crossed. In the last 20 years the country has almost quadrupled its production.

Youngstown Not Yet a Port

INTERSTATE commerce commission's refusal to permit the Pittsburgh, Lisbon & Western railroad to build a rail link that would enable Youngstown, O., district producers of iron and steel to take their products directly to the Ohio river for trans-shipment to lower Ohio river and Mississippi river destinations is a heavy blow to the proposal to make Youngstown more competitive with the Pittsburgh and Wheeling, W. Va., districts.

The theory the commission approves, but the one present tangible means of effecting its accomplishment it rejects. And the commission having indicated that any consent in the future would be predicated upon the application being made by an interest not affiliated with or controlled by any major shipper, the Pittsburgh, Lisbon & Western, which is a subsidiary of the Pittsburgh Coal Co., passes out of the picture.

The recourse of the Youngstown district is to attempt to establish service between the district and the Ohio river via the Pennsylvania and Pittsburgh & Lake Erie railroads. This is what the commerce commission suggests. It is, however, to be assumed that these carriers, having been unable to reach an agreement with steel shippers in the past, are no more willing now, although the commerce commission undertakes to point out that fears of loss of revenue through diversion of traffic to the rivers are not too well grounded.

To what extent the commission's decision renders these carriers more amenable remains to be seen. Some believe a reduction in coal moving from the Pittsburgh district to the Youngstown district will precede any efforts to take finished steel from the Youngstown mills to Ohio river barges. To the extent that the Youngstown district can go to the railroads and demand action, the commission has acted favorable toward the interested producers.

The Youngstown Sheet & Tube Co. ten years ago bought 110 acres at Smith's Ferry, Pa., for a terminal and surveyed a railroad from Youngstown to that point, but not having acted in a decade, it may be assumed that it will not now undertake the task, especially since the commerce commission frowns upon a shipper-carrier combination.

So Youngstown remains without its corridor to the Ohio river and its window looking out upon the stream, which each month is floating more Pittsburgh and Wheeling iron and steel.

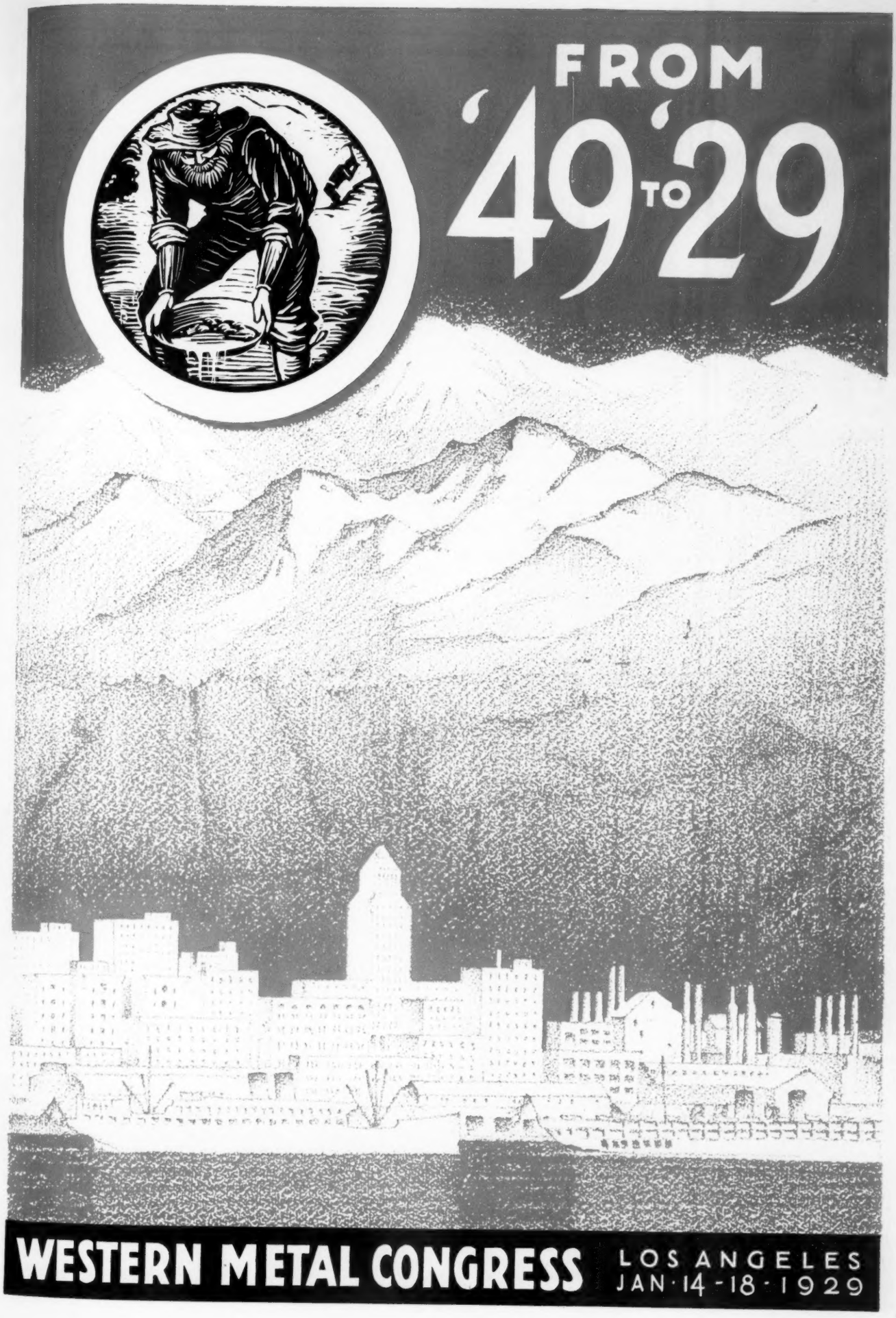
By-Products No Longer Cinderellas

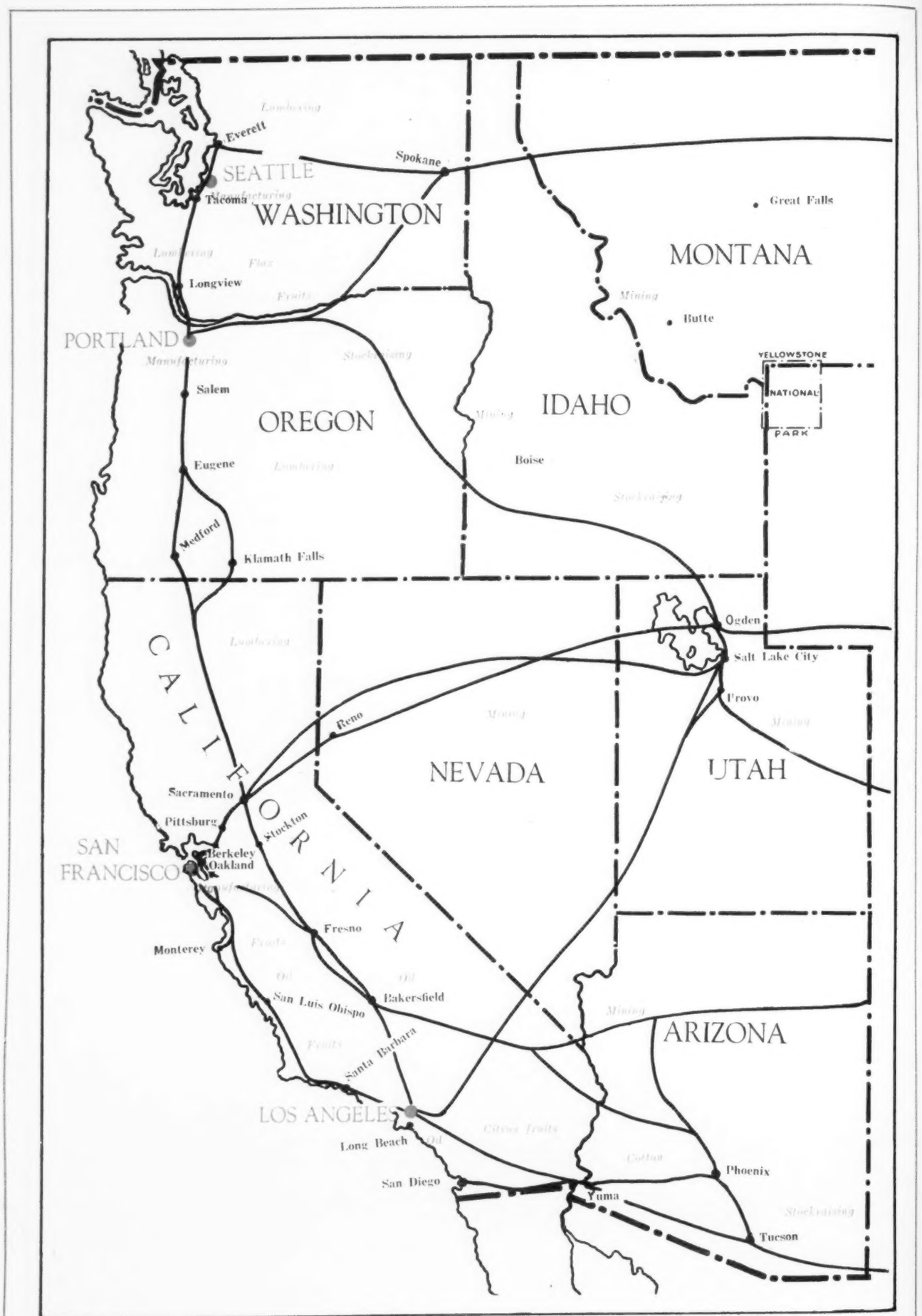
THERE was a time when the word by-product as used in connection with the production of coke was accurate, implying a supplementary or subordinate product, but the final report on 1927 coke production just issued by the federal bureau of mines compels a changed interpretation.

Last year the by-product coke production of 43,884,726 net tons was valued at $232,043,803. The by-products from this operation were valued at $138,724,013, or 60 per cent of the major item of the industry. The 7,207,417 tons of beehive coke made last year were worth only $30,276,775.

Especially during the war was gas the most lowly of all products of the by-product oven, yet the market value of this commodity in 1927 was $70,092,168, which is more than the $16,095,478 of tar, $27,383,268 of ammonium sulphate or equivalent, and $25,153,099 of crude light oil and derivatives put together.

With the increasing use of gas, this product's ascendancy seems assured. More than one by-product coke installation has been predicated upon a supply of gas, with coke and even pig iron the supplemental resultant.


FROM
'49 TO 29
WESTERN METAL CONGRESS
LOS ANGELES
JAN·14-18·1929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IDAHO
Boise
Eugene
Medford
Klamath Falls
Ogden
Salt Lake City
Provo
Reno
NEVADA
UTAH
CALIFORNIA
Sacramento
Pittsburg
Stockton
SAN FRANCISCO
Berkeley
Oakland
Fresno
Monterey
San Luis Obispo
Bakersfield
ARIZONA
Santa Barbara
LOS ANGELES
Long Beach
San Diego
Phoenix
Yuma
Tucson

The Great Empire of the Pacific

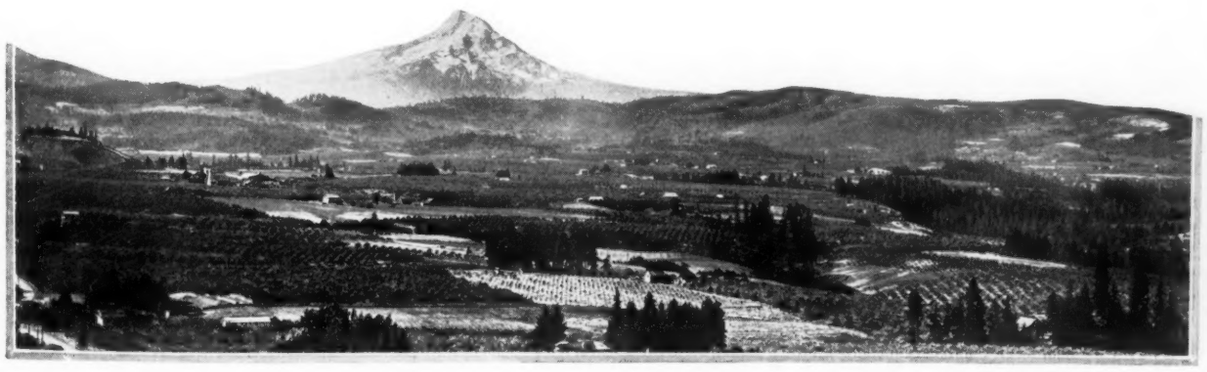
CALIFORNIA, Oregon and Washington, with their natural hinterland consisting of Arizona, Nevada, Utah and Idaho and parts of Montana and Wyoming comprise a section of the United States unequaled in possibilities for future development.

Historically the most dramatic, physically the most diversified and remarkable, and economically one of the most nearly self-contained sections of North America, this great empire of the Pacific has only begun to capitalize its advantages of boundless natural resources, attractive climate and proximity to the Orient.

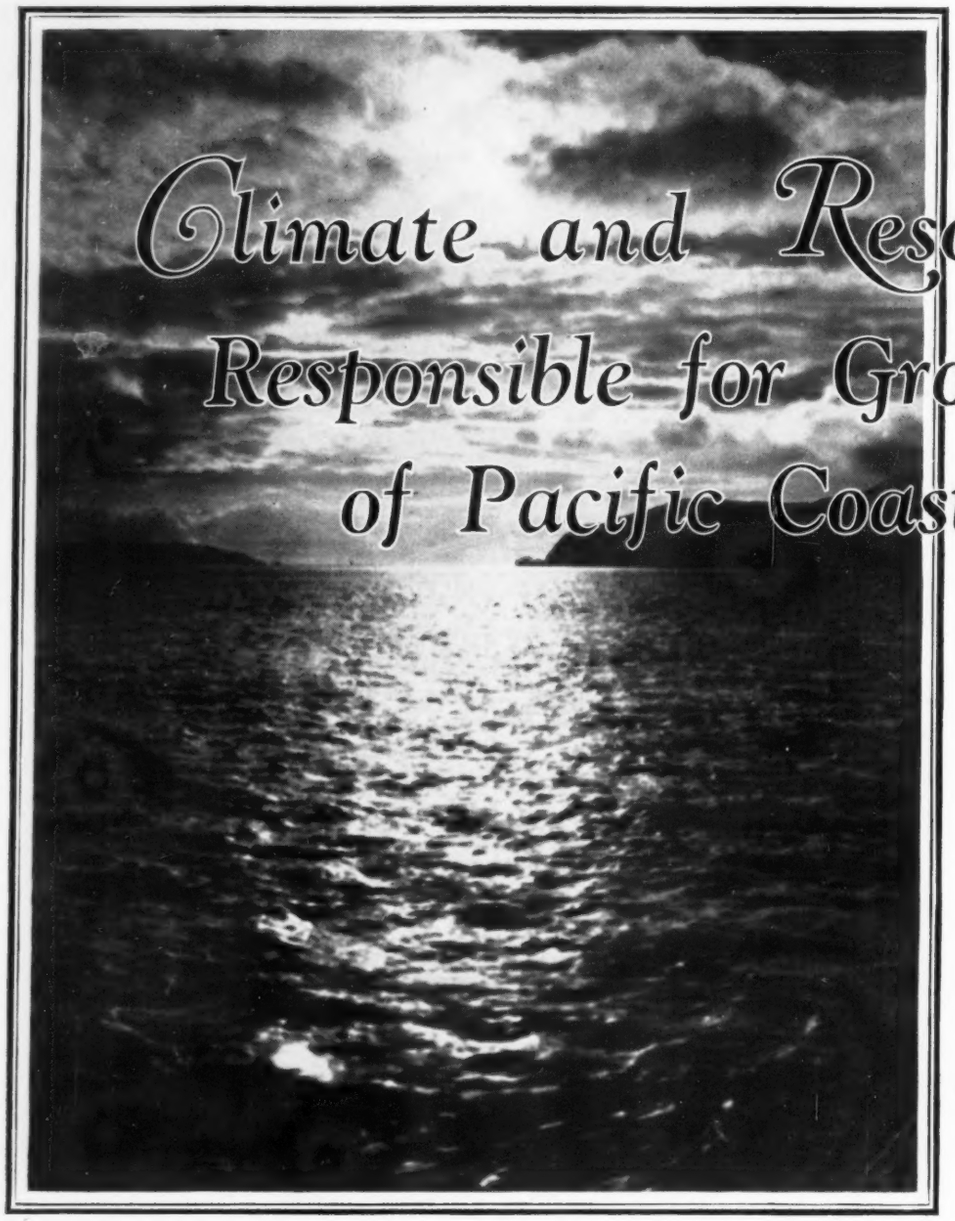
Since 1849, when the discovery of gold attracted the first significant rush of settlers to the Pacific coast, a steady procession of important events has contributed to the growth of this territory. The Comstock lode, completion of transcontinental railroads, reclamation of arid lands by irrigation, opening of the Panama canal and awakening of trade with the Far East all have influenced the development of the Pacific states.

Today with roughly one-quarter of the area and 8 per cent of the population of continental United States, this Pacific empire leads all sections of the country in the mining of gold, silver and lead and holds an important position in regard to many other minerals. It is second only to the mid-continent field in the production of petroleum and natural gas. It surpasses all other sections combined in the footage of standing timber and supplies 40 per cent of the lumber cut in the United States. Thirty per cent of the nation's wool is clipped from its sheep. It holds first place in fisheries and in the packing of fish and is the foremost source of canned and dried fruit. Within its borders is greater capacity of developed water power than in any other geographical division. Fourteen per cent of the country's ocean-borne commerce passes through its ports. It is the center of the moving picture industry. Its motor vehicle registration of 337 per 1000 population is far ahead of that of the nearest rival. Its mountains, deserts, canyons, beaches, lakes and forests constitute the most popular playground of North America.

Blessed with these natural and artificial advantages, it is not surprising that commercially and industrially the empire of the Pacific is forging to the front with great rapidity. In view of the far-reaching significance of this development, and to appropriately herald the occasion during the week of Jan. 14 of the first Western Metal congress and Exposition at Los Angeles, IRON TRADE REVIEW presents in "From Forty-nine to Twenty-nine" a brief history of the rise of the Pacific empire to its present state of importance, an analysis of its current industrial activity and a picture of its future potentialities.



Climate and Resources Responsible for Growth of Pacific Coast



The famous Golden Gate, through which passed 100,000 eager seekers for gold in the rush of 1849

ECONOMIC development of a territory is said to be strongly influenced by its natural resources, climate and location or accessibility. In studying the history of the states of California, Oregon and Washington in terms of these three fundamentals, we quickly perceive that their remarkable growth is due largely to the first two, and that the third has been a retarding factor.

From the latter part of the sixteenth century, when Drake, Cook and other navigators touched the American shores of the Pacific, until early in the nineteenth century, the great nations of the world paid scant attention to this western territory. Only the friars of the Spanish missions and the native Indians had settled in its more accessible valleys.

But with the explorations of Lewis and Clark in the Northwest, the arrival of Russian hunters, the entrance of Boston traders and the activities of the American Fur Co. and the Hudson Bay Co., the year 1830 found several hundred pioneers on the Pacific coast. As the American influence gained strength, that of the mission and native rule waned, and thus the stage was set for the treaties of 1846 and 1848, by which the United States came into possession of the Oregon territory, or Northwest, and the land ceded by Mexico, comprising the great Southwest.

On Jan. 24, 1848, gold was discovered on the American river about 50 miles from the present site of Sacramento. Within three months the cities of San Francisco and Monterey were deserted. Their inhabitants had rushed to the gold fields. The news spread to all corners of the world. Early in 1849 the influx of seekers for gold began in earnest and during the ensuing year more than 100,000 passed through the Golden Gate, enroute to the new source of gold.

Scarcely had the gold fever subsided when in 1859 the Comstock silver lode was discovered in Nevada. Again San Francisco was the scene of an influx of frenzied humanity, lured through the Golden Gate by the promise of wealth. The service of these two great events in the annals of mining in attracting the attention of the world to the Pacific coast cannot be overestimated. Perhaps in no other way could this territory have won the limelight so quickly, dramatically and effectively.

The presence of oil in California had been known from the early days of mission rule, but it was not until the end of the nineteenth century that the production of petroleum assumed importance. In 1892 a well was drilled to 365 feet near Los An-

geles and within three years 300 wells had been put down in this territory. Ten years later the number had increased to 1400. In 1899 J. F. Elwood struck oil at Bakersfield and immediately great activity in this field ensued. As a result of operations in the Bakersfield, Signal Hill, Santa Fe Springs, and other fields, the state in 1926 was the leading producer in the country. It is interesting to note that in 1926 the value of petroleum produced in California was $355,000,000 as against $13,000,000 in that year for gold and silver—the minerals which first drew world attention to the "Golden" state.

High Lights in History of Pacific Coast

1846—United States acquires Oregon territory.
1848—Mexico cedes California to United States.
1849—Gold hunters rush to California.
1859—Comstock lode discovered in Nevada.
1869—First transcontinental railroad completed.
1873—Orange trees planted in Southern California.
1899—California oil industry gains impetus.
1902—Reclamation act of United States passed.
1911—Roosevelt dam completed.
1914—Panama canal opened to traffic.
1928—Merchant Marine act stimulates shipbuilding.

In the meantime, the natural resources of the Northwest were attracting settlers to northern California, Oregon and Washington. Fur trading, which lured the Astor companies and the Hudson Bay Co. to the Columbia river district, gradually gave way to fisheries as the leading industry, and in turn, as the timber resources of the East and South were dissipated by extensive cutting, the unexcelled stand in Oregon and Washington became the chief physical asset of those states.

From the foregoing we have seen that the natural resources of the Pacific coast have played a dramatic role in its development. First, fur, then gold, and in succession silver, fisheries, oil and lumber brought important industries to the Pacific states.

It is difficult to state with exactness the date when climate began to act as a magnet to draw inhabitants to the West coast. Perhaps the date lies somewhere in the period of transition when the large one-crop ranches were giving way to the small farms, dependent on many crops.

At any rate, early settlers were not long in recognizing the opportunities in the land and climate. The first attempts at agriculture were in the valleys where natural rainfall was sufficient and to restricted areas in the south where the Spaniards and Indians had subjected small patches of ground to irrigation. In visualizing this great empire of the Pacific, one must always keep in mind the fact that a great triangular section, extending from western Texas west almost to Los Angeles, and with its apex in eastern Oregon, is an arid region, with insufficient water fall to support vegetation. These arid lands, together with surrounding semi-arid sections, require artificial water to insure regular crops, and it is due to irrigation that desert land in some parts of California has been made the most productive acreage in the United States. Moreover, due to the climate throughout the Coast states, practically every fruit and vegetable known to the tropical and temperate zones may be grown somewhere in this great empire.

The greatest advances agriculturally have occurred since 1900. The reclamation act, passed by the United States in 1902, certain state legislation and private enterprise have been responsible for important irrigation projects in the three states. One of the most interesting results of the growth of agriculture has been the development of co-operative marketing. The popularity of Sunkist raisins and Del Monte fruits bear witness to the effectiveness of this method of merchandising.

But the influence of climate did not end with the stimulus to agriculture.

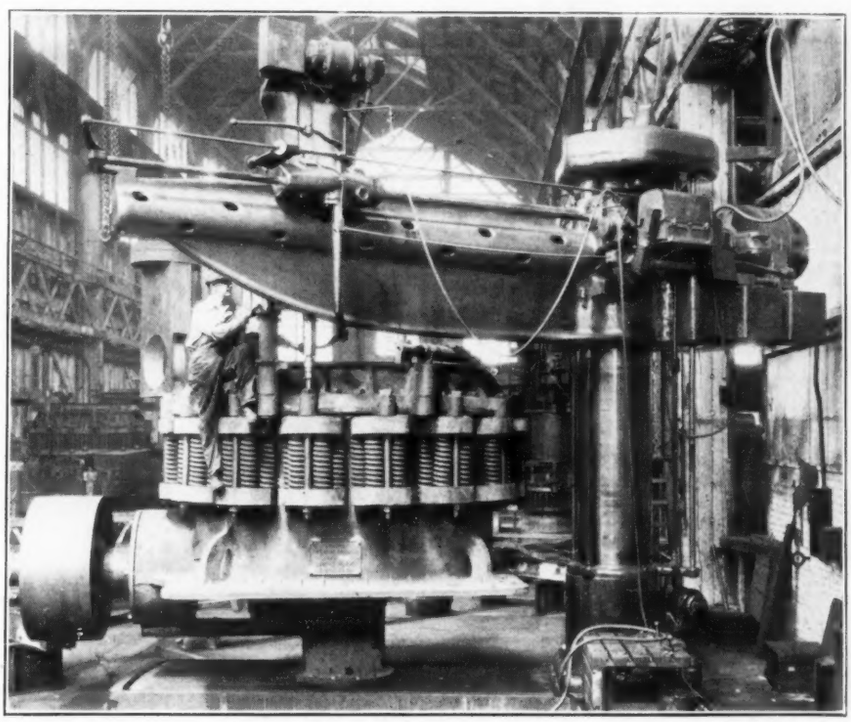
The first pictures were made in New York, but when Cecil B. DeMille rented a barn in Hollywood, and engaged in making pictures, attention was drawn to the advantages of California's varied scenery and ideal climate. To quote Will H. Hays, president, Motion Picture Producers and Distributors of America, "California had everything the motion picture director needed." Soon practically all of the picture-making companies moved to the Coast.

What moving pictures have meant

Growth in Population of Pacific States

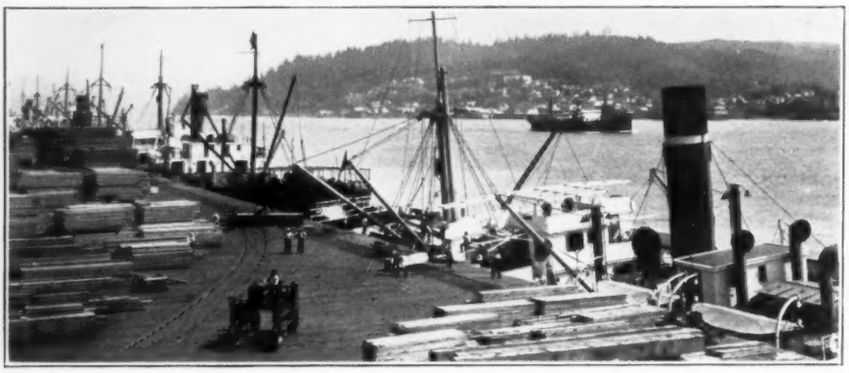
Census Year	California Population	California Per Cent Increase	Oregon Population	Oregon Per Cent Increase	Washington Population	Washington Per Cent Increase	United States Per Cent Increase
1850	92,597	.....	13,294	.....	.....	.....	.....
1860	379,994	310.3	52,465	296.9	11,594	.....	35.6
1870	460,247	47.3	90,923	73.4	23,955	106.6	22.6
1880	864,694	54.3	174,768	92.3	75,116	214.2	30.1
1890	1,213,398	40.3	317,704	82.1	357,232	365.1	24.9
1900	1,485,953	22.4	413,536	30.2	518,103	45.0	20.7
1910	2,377,549	60.1	672,765	62.7	1,141,990	120.4	21.0
1920	3,426,861	44.1	783,389	16.4	1,356,621	67.6	14.9
1927*	4,433,000	29.4	890,000	13.7	1,562,000	11.5	12.2

*Estimated.



Machining a large casting for a cone crusher in plant of the Llewellyn Iron Works, Los Angeles

to the United States is beyond estimate. To date 20,250 theaters for motion pictures have been built in this country—some of them monumental structures comparing favorably with the best erected for opera or drama. About 85 per cent of the pictures of the world are produced in the United States—for the most part Hollywood.



Loading vessels on Columbia river near site of new Longview-Ranier bridge, for which Bethlehem Steel Co. will furnish steel

From 1849 the steady increase in population accentuated the problem of communication. Sentiment for a transcontinental railroad was strong, and, after a lengthy argument over various routes, it was decided to build a line through Utah. On May 10, 1869 the rails of the Union Pacific from the East, and those of the Central Pacific from San Francisco were joined at Promotory, Utah. In 1883 the Southern Pacific completed a line from New Orleans to Los Angeles, and in 1885 the Atchison, Topeka and Santa Fe entered San Diego. These transcontinental roads, with the Northern Pacific and Great Northern entering Portland and Seattle, played important roles in the development of the coast states, as well as Arizona, Utah, Nevada, Idaho, and other nearby commonwealths.

Panama Canal Broadened Markets

Important as were the railroads in building up the Far West, the stimulus to commerce resulting from the opening of the Panama canal was even more significant. According to the *Panama Canal Record*, the commercial tonnage passing through the canal to and from United States ports on the Pacific during the last six years was as follows:

Year	To Pacific U. S. Ports, cargo tons	From Pacific U. S. ports cargo tons
1922	1,673,000	2,868,000
1923	3,202,000	7,456,000
1924	3,347,000	12,984,000
1925	3,056,000	8,966,000
1926	3,308,000	11,679,000
1927	3,437,000	12,427,000

These figures are interesting in that they show that the spread between westbound and eastbound traffic steadily is increasing in favor of shipments from the Pacific. While the annual tonnage in westbound cargoes doubled in the six-year period, that of eastbound traffic increased almost five fold, due largely to California petroleum and northwest lumber. The canal unquestionably has been an important factor in removing the barriers of prohibitive transportation costs and thereby opening broader markets for western oil and lumber products.

Development of the Pacific coast during the postwar period has been remarkable in that many large projects looking to future requirements for water, power and transportation have been initiated. The water supply systems for Los Angeles and the East Bay district of San Francisco represent two of the greatest engineering undertakings of the century, and are predicated on the expectation of a steady maternal growth in population and in the industrial activity of these leading commercial centers. Modern roads have been built, in some cases involving bridges of exceptional size and also difficult construction in mountainous country. Important progress also has been made in river and harbor improvement, in irrigation, and in the reforestation of cut-over timber land. Meantime building construction and other improvements have greatly changed the physical aspects of the principal coast cities, creating skylines and thoroughfare vistas comparable to those of eastern cities.

* * *

THE future of the empire of the Pacific appears to be more promising than that of any other section of the country, with the possible exception of certain parts of the South. The possibilities in agriculture have scarcely been scratched, and the completion of pending and future irrigation projects will create vast areas for cultivation, thus providing support for new population.

Foreign trade undoubtedly will play an important role in future economic growth. Standing at the gateway to the Far East, Pacific ports should be in a position to profit from the increasing Oriental trade. Likewise, the coast cities—and particularly those of the Northwest—seem destined to share in the almost certain early exploration of the rich undeveloped resources of Alaska.

These factors coupled with the rapid improvement of communication by radio and airplane, which is helping to dissipate obstacles of distance undoubtedly will bring new opportunities.

A crew in Washington planting young trees where timber has just been removed. Profiting from mistakes of the past, lumber interests now are actively promoting reforestation

Pacific Coast Is Growing Market for Steel and Equipment

Extensive Engineering Projects and Expansion of Industrial Activities Contribute to Consumption—Manufacturing Responds to Increased Requirements of Growing Population

By E. L. Shaner
Editor, Iron Trade Review

IN CONSIDERING the industrial development of the Pacific coast, Easterners should abandon all yardsticks by which industry is measured in the East. The environments are so different and the entire economic structures have so little in common that it is futile to even attempt to make comparisons.

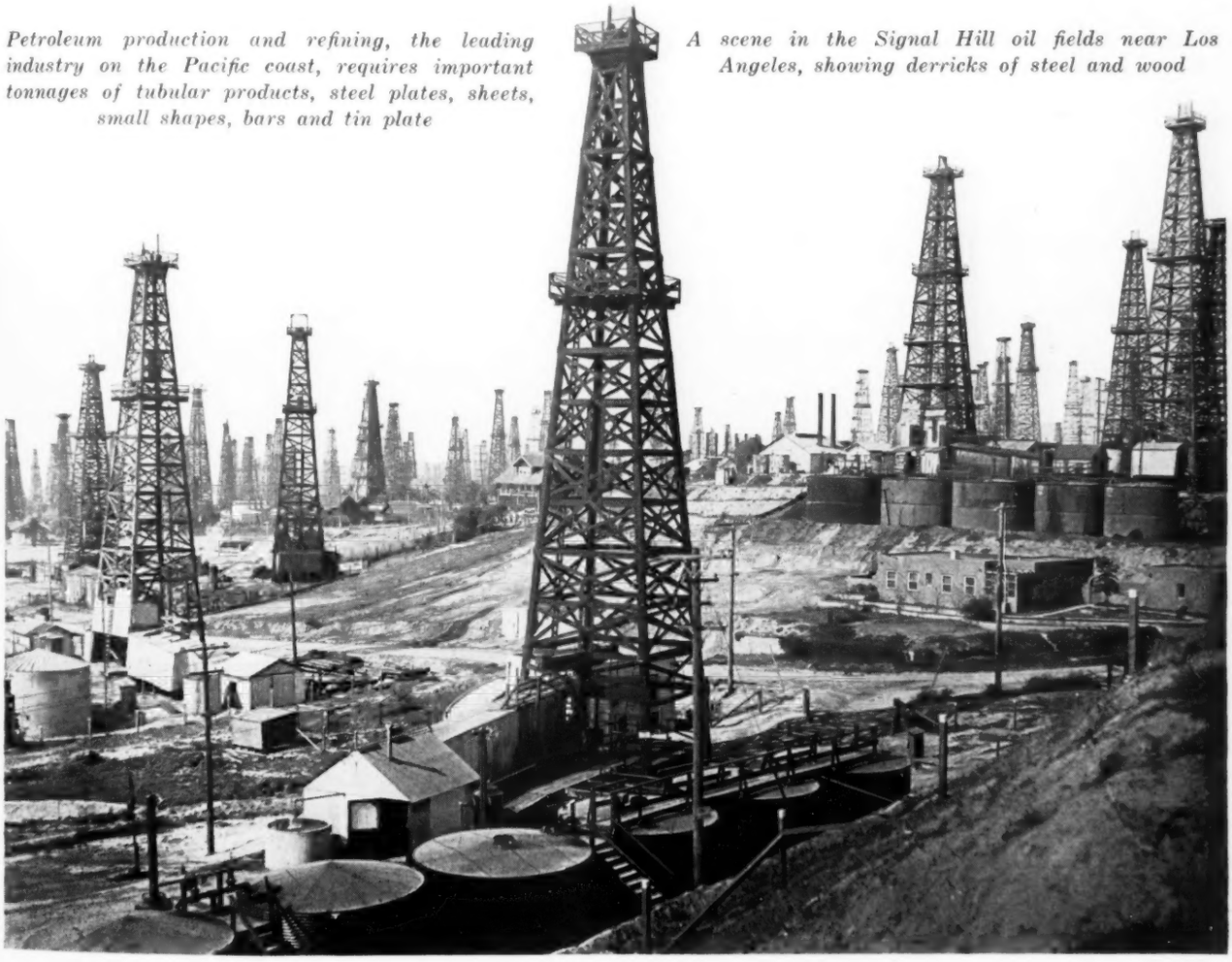
At the outset it should be understood that the states of California, Oregon and Washington and contiguous eastern territory do not constitute a homogeneous economic area. In fact the only justification for grouping them into a single entity and calling it the "Pacific coast" section is that geographically the three have a common relationship to the industrial East.

As indicated on the map appearing on Page 1630, there are three distinct commercial districts in the Pacific states. The oldest, and most important because of the diversity of its activities, is central and northern California and adjacent areas to the East, of which San Francisco is the trade center. The second in point of years is the Northwest, comprising Oregon, Washington, Idaho and part of Montana, of which Seattle and Portland are the leading marts of trade. The third and youngest but most rapidly developing is southern California and nearby sections of the Great American desert, of which Los Angeles in the metropolis.

Each of these three divisions has a distinct individualism, created by its own problems, distance from its neighbors, and by intense rivalry.

Petroleum production and refining, the leading industry on the Pacific coast, requires important tonnages of tubular products, steel plates, sheets, small shapes, bars and tin plate

A scene in the Signal Hill oil fields near Los Angeles, showing derricks of steel and wood



FISHERIES in the Pacific ocean and in the bays and rivers of the coast support one of the most important canning industries of the country, thus making the Far West an important consumer of tin plate.

At the right workmen in Los Angeles harbor are shown cutting up tuna for canning.

Below is shown a 70-foot fishing boat which plies the waters of the Northwest. This vessel is powered with a 120-horsepower diesel engine.

For these reasons, the problem of distribution is more complicated than is generally realized. The majority of companies conducting business in the coast states find it necessary to maintain offices in San Francisco, Los Angeles, and in either Seattle or Portland or both. Practically all of the leading steel producers and machinery builders are represented in these centers by their own sales officials or by manufacturers agents. The most popular arrangement seems to be to maintain offices or agents in Los Angeles, Seattle and San Francisco, the operations in all three districts being under the direction of a Pacific coast manager situated in the last named city.

Where Material Originates

Practically all iron, steel and equipment consumed in the far western market is produced or manufactured locally or is shipped by water from Atlantic or Gulf coast ports of the United States or from European countries. In recent years shipments by rail have been confined largely to tonnage purchased for use by the transcontinental railroads or to material or equipment for special use.

The shift from rail to water shipment was given an impetus by the opening in 1914 of the Panama canal, which exerted a definite retarding influence on the all-rail movement of steel to the coast from Chicago mills. It became possible for Pittsburgh to ship by rail to eastern tidewater and thence through the canal cheaper than Chicago could move its products west by rail.

Another and even more drastic influence resulted from the action in July, 1920, of the interstate commerce commission in Ex Parte 74 in increasing inter-territory rates 33 1/3 per cent. This raised the rate on steel products from Chicago to Pacific points from $1.25 to $1.665 per 100 pounds. Meanwhile the rate from Pittsburgh to Baltimore was 35½c and from Baltimore to the Far West about 70c, making a combined rail-and-water cost of $1.055 against an all-rail expense of $1.665 from Chicago. Since that time the Atlantic coast to Pacific coast all-water rate has been lowered by stages to from 30c to 35c per 100 pounds. Announcement has just been made of a revision to take effect Jan. 1 which will increase the coast-to-coast rate on many steel items about 5c per 100 pounds.

During the past five years the market quotations on plates, shapes and bars at San Francisco have averaged about 35c higher than the Pittsburgh base prices of these products, the spread being approximately equal to the water freight rate.

The relative percentage of the total Pacific coast demand for iron and steel tonnage supplied by local, eastern and foreign producers fluctuates from time to time, due to a complicated system of influences at home and abroad. During 1928 the tendency was toward a reduction in imports of all pig iron and steel products with the possible exception of reinforcing bars. For several years the proportion of pig iron furnished by the single local stack has grown and imports of iron have dropped off perceptibly.

Local Output Augmented

Expansion of rolling mill capacity on the Pacific coast, which seems to be going forward under capable management and with a sound regard for conservative growth, will increase local production considerably. Whether this acceleration will exceed the natural growth of consumption and thereby reduce the proportion of tonnage supplied from outside sources cannot be determined conclusively from present

indications, but in the opinion of this winter, the outlook for local producers appears promising. Lack of balanced demand is a serious limiting factor which will militate against the economical production of certain steel items locally.

* * *

CONSUMPTION of rolled steel products probably amounts to about 2,000,000 tons annually. Absence of definite statistics and the uncertain methods by which intercoastal cargoes are classified and reported makes it practically impossible to construct a dependable statistical picture of the market.

Imports of foreign iron and steel account for about 120,000 tons, while shipments through the Panama canal and by rail from eastern mills apparently ranges somewhere between 1,500,000 and 2,000,000 tons. These tonnages, together with the local production of about 500,000 tons, indicate a total consumption somewhat in excess of 2,000,000 tons.

Chief among the industries contributing to this market is petroleum producing and refining. It is estimated from the number of wells drilled and the average amount of steel used per well that in 1927 about 110,000 tons of tubular products were consumed in the oil fields of California. Plates required for storage tanks accounted for from 40,000 to 50,000 tons, while pipe lines from producing fields to refineries or to tidewater terminals required about 15,000 tons of pipe. Important additional tonnage went into derricks, tools, sucker rods, buildings, small tanks, containers, stills and refinery equipment.

Canning of fruits, vegetables and fish makes the Pacific coast an important market for tinplate. In checking back from the reports of the various canner's associations on the number of cans packed during a normal year, it is evident that no less than 400,000 tons of tinplate are consumed annually. This figure is roughly confirmed by the amount of scrap offered for detinning at the one detinning establishment on the coast.

Much of this tonnage goes direct to the larger can companies, such as the American Can Co. and the Continental Can Co. Most of the smaller packers of fish buy their cans from these companies, but the large Alaska salmon packers make their own cans and buy their tin plate direct from the producer. Owing to sharp variations in the salmon pack, the number of base boxes is subject to fluctuation from year to year.

Fruit growing offers a moderate, but interesting outlet for certain rolled steel products. Smudge pots or orchard heaters which are employed to protect maturing citrus fruits from the cold at night account for several hundred tons of 24 and 26-gage galvanized steel sheets. Tree props, of twisted 9 or 10-gage galvanized wire, require a small amount of plain wire annually. In the Northwest apple orchards, networks of from ¾ to 2-inch galvanized pipe are used to distribute insecticide to convenient points for spraying. A considerable tonnage of 24-gage galvanized sheets goes into pipe for local irrigation systems. Many of the old wooden flumes of the Northwest, built to carry water down into the semi-arid areas, are being lined with 27-gage galvanized sheets to prolong their period of usefulness. Corrugated galvanized sheets are used almost to the exclusion of other materials in the construction of canning factories, sheds and other buildings in the orchard belt.

Modern lumbering requires mechanical equipment capable of withstanding severe treatment. The illustration above shows a 325-horsepower, 6-cylinder, 4-cycle diesel engine powered steel tower skidder and loader operated by the Long Bell Lumber Co. at Riderwood, Wash. The demountable tower takes the place of timber masts used previously. Electric driven lumber rigs also are coming into use

The western market is notable for engineering projects involving contracts for large tonnages of plates and shapes. This is not surprising in view of the topography of the country, which necessitates communication lines of great length, and frequent crossings of broad bays and large rivers.

Projects Require Large Tonnages

As indicative of the size of some of these projects and their relation to the consumption of steel, the construction of the water supply system connecting the Mokelumne river and the East Bay region of San Francisco may be cited.

The steel plates required for the first unit were rolled at eastern mills and were machined at the plant of the Newport News Shipbuilding & Dry-Dock Co. to exact form and dimensions required. They then were shipped to Berkeley, where they were fabricated into pipes 65 inches in diameter by the Steel Tank & Pipe Co.

Each pipe required two plates, fastened in cylindrical form by means of two seams. Both electric welding and riveting methods were used in this construction. The first unit of this project required 75,000 tons of plates for the 65-inch pipe alone. Work is still underway, involving dams, tunnels, and other construction requiring the use of shapes, plates and reinforcing bars.

Another illustration of the tonnage significance of water supply systems is that of the Hetch Ketchy project, for which contracts were placed in 1923 for 16,700 tons of shapes for a bay crossing pipe line and 8000 tons of shapes for penstocks for a power plant. Orders for steel for penstocks frequently amount to from 1500 to 3500 tons for each project.

Bridges and buildings account for a large tonnage of fabricated structural steel annually. One of the largest bridge contracts in recent years was that for the bridge spanning the Carquinez straits. This involved 16,000 tons of shapes, awarded in 1925. Typical of the tonnage for Pacific coast buildings are 11,000 tons for a general hospital in Los Angeles and 6,640 tons for Los Angeles city hall, awarded in 1926 and 1927. Numerous bridges and buildings erected during the past few years have involved contracts ranging from 2500 to 7500 tons each.

Owing to the favorable conditions for the production of hydroelectric power and the necessity of transmitting the current at high tension voltage to the consuming centers, the Pacific coast represents an important market for transmission towers. Most of this business is awarded to the Pacific Coast Steel Co., which operates an extensive plant at South San Francisco for the fabrication and testing.

Single contracts involving as much as 4000 tons of shapes and bars have been recorded recently.

Annual Consumption Varies

The total consumption of fabricated shapes on the Pacific coast varies so much from year to year, that it is difficult to arrive at a fair estimate of the normal annual tonnage. Authorities seem to agree that it is in the neighborhood of 90,000 to 100,000 tons.

The consumption of reinforcing bars is surprisingly heavy, in spite of the fact that the nature of irrigation, flood control and hydroelectric work greatly enhances the market for this product. It is believed that no less than 100,000 tons of steel for reinforcing is used each year in the Pacific states.

Undoubtedly the prevailing Spanish type of architecture in Southern California is a factor in the selection of concrete for many structures in which structural steel would be used in other parts of the country. At any rate, this type of construction is liberally employed for buildings and for bridges when the span and other considerations will permit it.

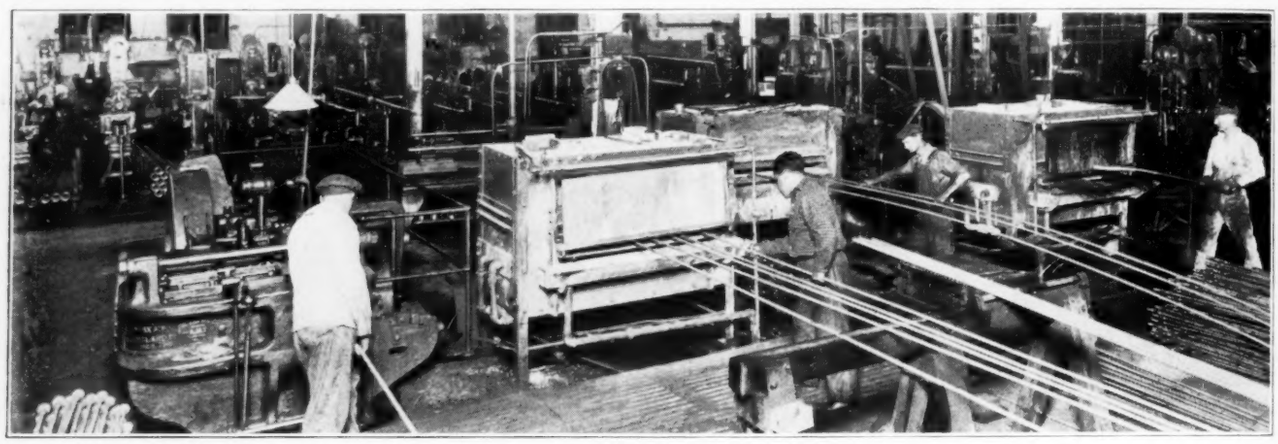
Awards Are Large

One of the largest contracts for concrete bars on record was that awarded in January of this year for 10,000 tons for the substructure for a viaduct between San Mateo and Alameda. More than 3000 tons went into a viaduct at Glendale, awarded in June, 1927.

The greatest tonnage, however, is for dams, canal locks, drainage systems, piers, and hydroelectric works. Foreign concrete bars figure prominently in the market, although at the present time the prospects for the greater use of locally rolled material seems more encouraging.

Steel sheets find a favorable market in the West. Owing to the mild climate, it is possible to erect industrial buildings of far lighter construction than is the case east of the Rockies. The most popular type of industrial building consists of a light framework of shapes, with corrugated galvanized sheet siding and roof, and steel window sash. The general adoption of this construction, not only for the smaller shops and factories, but also for the most extensive establishments on the coast, means that the consumption of galvanized sheets alone for this purpose amounts to several thousands of tons annually.

Hundreds of small tanks of corrugated galvanized sheets are used in California. These tanks are vertical, with the corrugations running horizontally. The popular size seems to



Forging furnaces and machines in sucker rod department of the Axelson Machine Co., Los Angeles. About 75 tons of ⅝, ¾ and ⅞-inch steel is consumed annually in California for sucker rods

Large stocks of pipe, casing and other products are maintained by numerous oil well supply houses

consist of two tiers of sheets, the diameter being 8 or 10 feet and the height about 5 feet.

Black sheets are employed for license plates, containers, and numerous other small products. Thus far the Pacific coast automobile manufacturing industries have not developed to the point requiring automobile sheets in quantity. Several assembly plants are operating in the principal cities and the leading American automobile body builder has a plant in Oakland.

The market for bars and kindred products is marked by great diversity. Probably the greatest tonnage goes to the oil fields, although the requirements of the railroads and miscellaneous manufacturing establishments are considerable.

An important proportion of the rod mill output of the local mills is consumed in the bolt, nut, and rivet departments of the mills. The wire products produced locally consist principally of nails, galvanized poultry netting and other staple wire goods. Welding wire is produced in one Pacific mill. Other products of importance in consumption are tool steel, chain iron, wire rope and steel rails. Saw steel finds an important outlet in the Northwest. Drill rod is used extensively in various districts, including Alaska. Tool steel for cutters, hand tools, etc. enjoy general distribution. Occasional shipments of chain iron are made to Seattle and San Francisco.

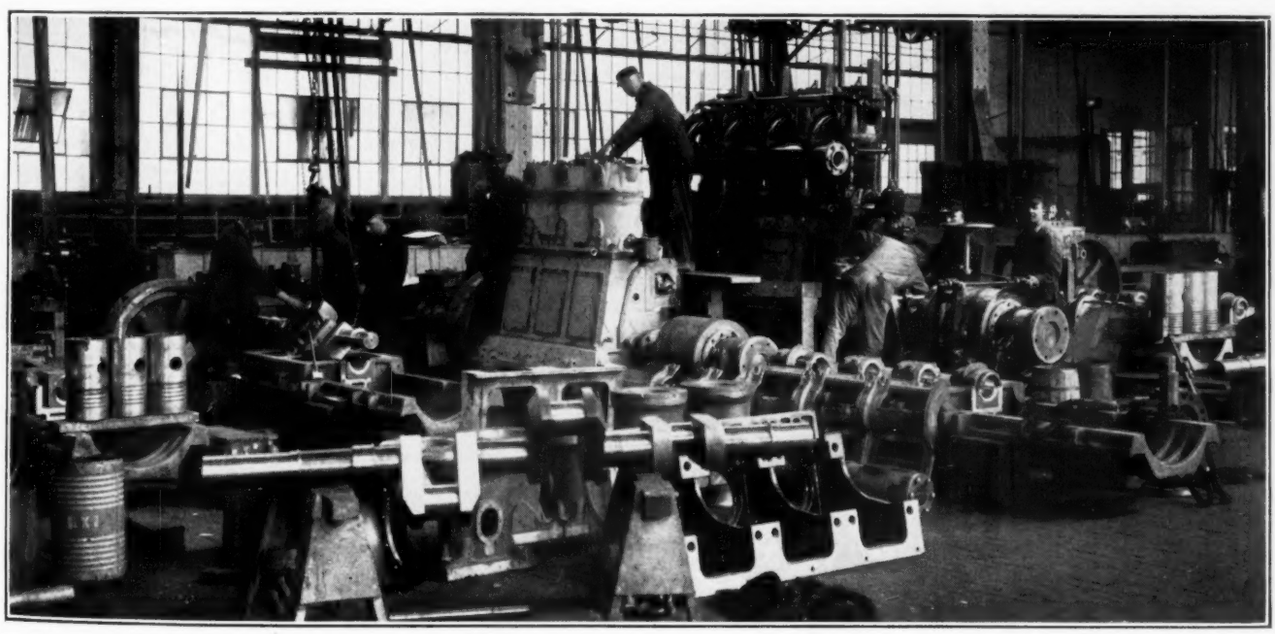
* * *

MANUFACTURING on a scale of mass production is still in its infancy, although demand rapidly is reaching the point where assembly lines will be in greater evidence in coast plants. Establishment in Los Angeles of several large branch factories of Akron tire and rubber companies and the growth in number of district automobile assembly plants undoubtedly forecast the arrival in the near future of a full-fledged automobile industry of moderate proportions.

Several local manufacturers of automotive products have developed products of world-wide acceptance. Among these are the Caterpillar Tractor Co., Hall-Scott Motors Co. and Fageol Motors.

One of the most important branches of the automotive industry in the far west is the manufacture of airplanes. The Boeing Airplane Co., Seattle; B. F. Mahoney Aircraft Corp., San Diego; Douglass Co., Santa Monica; Lockheed Aircraft Co., Burbank, Calif.; and Ryan Aeronautical Corp., San Diego, are important units of the rapidly growing airplane industry. The early construction of a large airplane factory for the production of Fokker planes in Southern California has been announced.

The engineering establishments in the Far West are called upon to do work of great variety. Much of this consists of mining and dredging ma-



Assembling a large diesel engine in the plant of the Washington Iron Works at Seattle

chinery, pumps and engines, oil well equipment and lumbering and sawmill machinery. A typical plant catering to this class of business consists of a foundry for steel and gray iron castings, a well appointed machine shop, a boiler or plate and shape fabricating department and a blacksmith shop. Facilities for gas and electric welding usually are provided. The limited use of coal in this territory has stimulated the building of diesel engines, not only for marine use but also for stationary equipment. Boilers for the lumber industry and for oil field use supply steady work for a number of shops. Water power projects, many of which involve the use of fabricated pipe, in recent years have provided important contracts for establishments equipped to handle this work. Fabricated tanks for fuel for house heating and for the storage of oil in industrial plants also furnish plate work of considerable volume.

Fabricating plant for transmission towers, Pacific Coast Steel Co., South San Francisco

Coast Foundries Number 441

While the majority of foundries are engaged in jobbing work, a number of them have developed specialties which permit production for stock or on a contract basis. One casting plant turns out one-piece side frames for railroad cars, wheel centers and other repetitive jobs. Sheave wheels and gears are popular products in a number of steel foundries.

According to *Penton's Foundry List*, the number of foundries in seven Pacific states is 441, classified and distributed as follows:

	Steel	Gray iron	Malleable	Nonferrous	Total*
California	28	145	5	152	244
Oregon	5	44	1	39	58
Washington	14	64	.....	59	91
Nevada	1	4	.....	5	5
Idaho	....	10	.....	9	10
Utah	2	19	.....	13	22
Arizona	2	11	1	10	11

*A foundry producing steel and gray iron castings is included under "steel" and also under "gray iron," but under "total" appears as one establishment. For this reason the totals are not the mathematical totals of first four columns.

Popularity of the electric process of steelmaking is indicated by the fact that of the 52 steel foundries listed, 45 are equipped to cast electric steel castings. Of these, 24 are in California, 12 are in Washington, and four are in Oregon. The low cost of electric current undoubtedly is a factor in this situation.

Forging and heat treating are important operations in many of the jobbing shops. Crankshafts for marine engines for the fleets of ferries, tugs, fishing boats and other vessels indicate the character of work that can be handled in western shops. In the oil country, heat treating and forging of high order is required in the production and maintenance of oil well tools and accessories. Improvements in drilling equipment have necessitated the use of a greater proportion of alloy steel in the oil fields than heretofore and this has accentuated the importance of heat treatment. This development fully justifies the prominent place given to the discussion of oil well tool problems in the technical program of the Western Metals congress.

Expanding industrial activity is bound to react favorably on the engineering establishments. With a broadened market for their equipment and services, the problem of stability of operation—a factor of concern in the past—promises to be alleviated.

MANUFACTURES in the three states bordering the Pacific in 1925 amounted to nearly three and a half billion dollars in value of products. The following figures, from the United States bureau of census, show the value of products of those industries which exert an influence on the use of steel:

CALIFORNIA

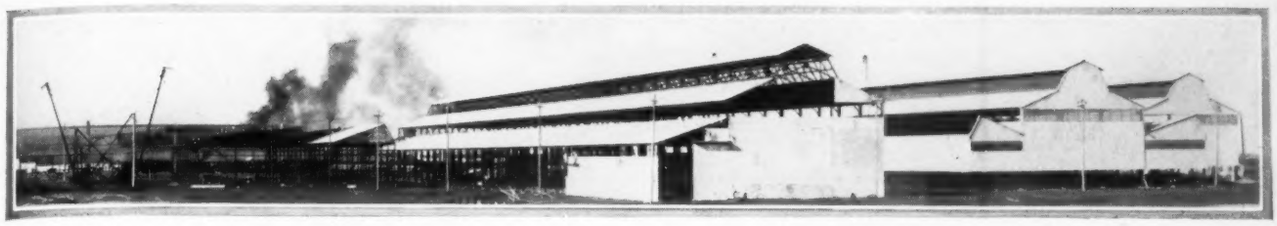
Industries	Value of Products
Agricultural implements	$ 2,924,955
Brass, bronze and nonferrous alloys and manufactures thereof	5,606,018
Canning and preserving, fish	17,873,316
Canning and preserving, fruit and vegetables	181,272,830
Car construction and repairs, electric railway	6,789,591
Car construction and repairs, steam railway	37,131,450
Chemicals	14,076,568
Clay products	18,846,013
Copper, tin and sheet metal works	11,005,941
Doors and sash, iron and steel	2,298,021
Electrical machinery and supplies	29,781,335
Engines and water wheels	14,896,918
Forgings not made in steelworks	905,269
Foundry and machine shop products	80,653,577
Iron and steel, steelworks and rolling mills	23,916,754
Lumber and planing mill products	141,726,301
Motion pictures	62,821,194
Motor vehicle bodies and parts	16,827,452
Motor vehicles	78,442,568
Petroleum refining	369,581,955
Pumps and pumping equipment	13,281,901
Shipbuilding, including repair work	14,164,489
Springs, steel, not made in rolling mills	1,166,844
Stamped and enameled ware	1,536,701
Stoves, gas and oil	8,600,425
Structural and ornamental ironwork, not made in rolling mills	14,620,457
Tin cans and other tinware	32,087,288
Wirework	5,863,787
Wrought pipe, not made in rolling mills	3,501,931
Total manufactures	$2,442,952,104

OREGON

Industries	Value of Products
Canning and preserving, fish	$ 5,898,762
Canning and preserving, fruit and vegetables	12,513,211
Car repairs and construction	6,264,468
Foundry and machine shop products	10,581,996
Lumber and planing mill products	130,496,672
Structural and ornamental ironwork, not made in rolling mills	1,342,948
Total manufactures	$ 352,948,841

WASHINGTON

Industries	Value of Products
Canning and preserving, fish	$ 11,791,416
Canning and preserving, fruit and vegetables	14,242,892
Car repairs and construction	16,582,294
Electrical machinery and supplies	1,331,649
Foundry and machine shop products	16,665,398
Forgings, not made in steelworks	844,467
Iron and steel, steelworks and rolling mills	4,575 343
Lumber and planing mill products	273,545,537
Motor vehicle bodies and parts	867,137
Shipbuilding, including repair work	4,082,084
Stoves (other than oil, gas or electric)	1,108.538
Structural and ornamental ironwork, not made in rolling mills	2,031.055
Tin cans and other tinware	7,309,695
Total manufactures	$ 659,339,836



New tinplate mills under construction by Columbia Steel Corp. at Pittsburg

Pacific Coast Steel Industry Is in Period of Expansion

FROM the earliest days of its development, the Pacific coast industries have labored under the disadvantage of being far removed from adequate supplies of iron, steel and machinery. Naturally this handicap of distance always has been a spur to local enterprise to establish its own productive facilities.

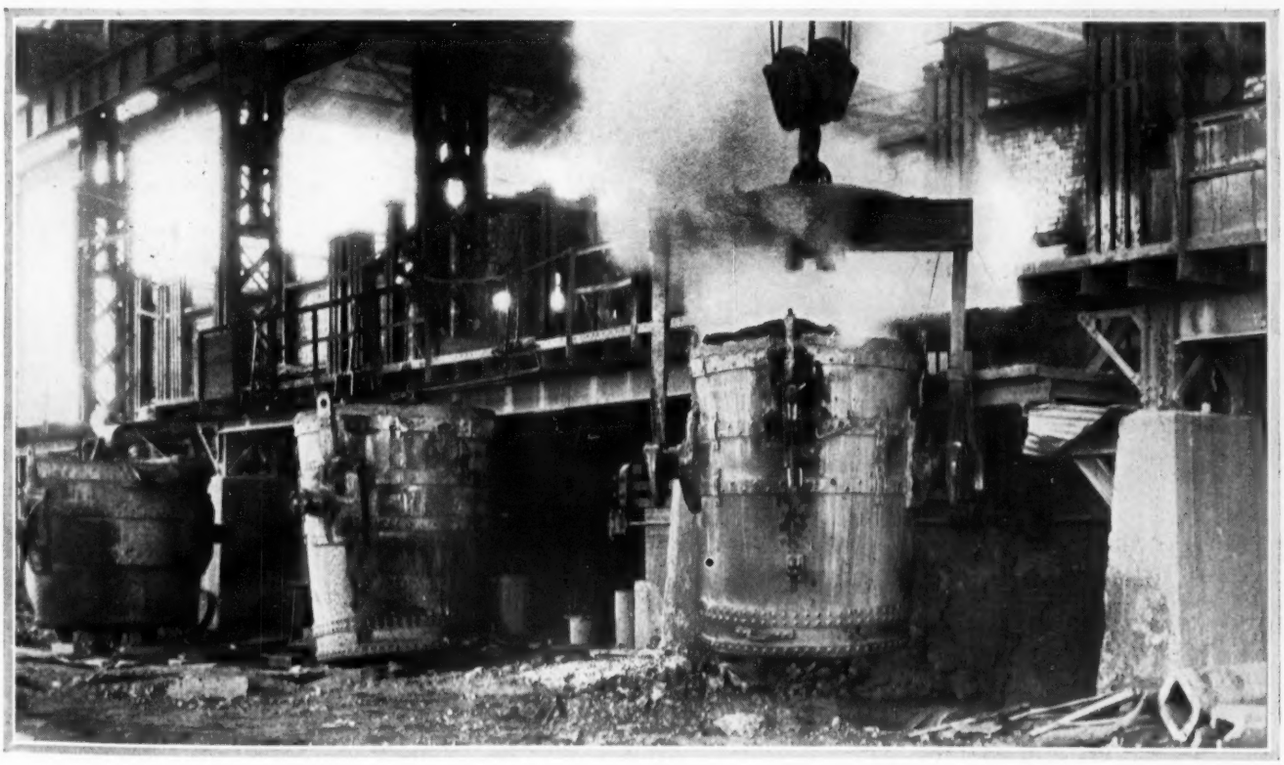
As long as the requirements on the coast were of moderate tonnage, the material came from eastern mills or from foreign countries. At the present time the consumption of certain iron and steel products has reached the point where important local producing capacity can be sustained. Already Pacific coast plants constitute the nucleus of a new steel producing district which is bound to grow in importance as consumption increases and broadens.

While lack of balanced demand probably will make it necessary and desirable to continue to use great tonnages of steel from eastern mills, the present growth of consumption points very clearly to the early addition of various steel products to the list of those which can be produced economically by local plants on the coast,

It has been an axiom of the American iron and steel industry that no important producing district could be developed and maintained unless an ample supply of coking coal were readily accessible. For many years the absence of this fuel retarded development in the western states. The presence of ores in the sands on certain portions of the Pacific shore line prompted several investigators to attempt to smelt these ores in experimental plants. While some of this work seemed to hold forth promise for success the results never were sufficiently satisfactory to encourage the reduction of these ores on a commercial basis.

In the meantime the progress made in the design of by-product coke ovens has been such that engineers were stimulated to study the possibility of coking the so-called non-coking coals. Success attending these efforts in connection with certain middle western coals paved the way for the attempt soon after the war to successfully coke Utah coals.

Shortly after the incorporation on

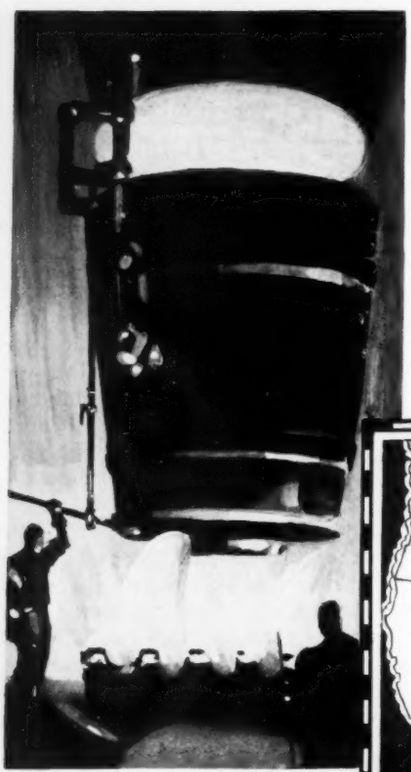


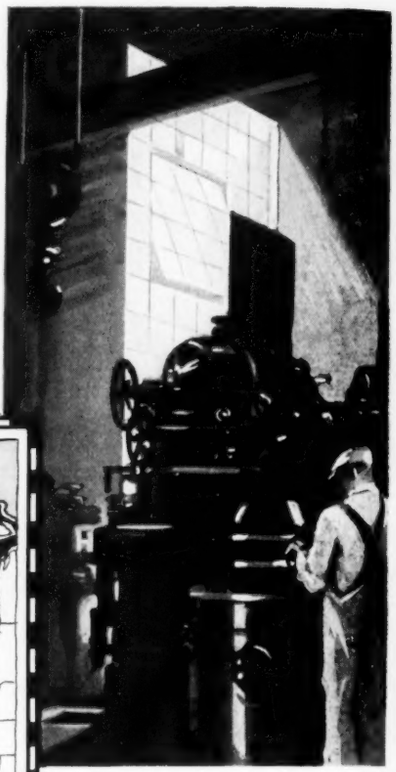
Tapping a basic open-hearth furnace at Torrance, Calif., steelworks of Columbia Steel Corp.

FIRST

in the Manufacture of

FOUNDRY *and*
MACHINE SHOP
Products
west of
Chicago!





Los Angeles

THE INDUSTRIAL COUNTY

Foundries and Machine Shops flourish in great concentrations of population because their product is a basic need of modern life. The value of the production of this industry in Los Angeles County places it first among all counties west of Chicago. The production of all factories in Los Angeles County in 1927 reached over *one billion dollars*—(Government figures).

Los Angeles County is the largest market and industrial center in the West. Its local market comprises more than 4,000,000 people, over one-third of the purchasing power of the eleven Western States.

It contains nearly twice the number of factories and well over double the wage earners — wages paid — and value of output — of the next most important industrial County west of St. Louis.

But what is more important, its rate of industrial growth is overwhelmingly faster than any County of comparative importance in the whole country.

It is not a one-industry community — its manufacturing is highly diversified.

While Los Angeles County is known as the world's movie capital, its largest city outranks in manufacturing all cities west of Chicago in automobile parts and accessories, rubber tires, oil refining, wearing apparel, structural and ornamental iron and various other industries. One of these is foundry and machine shop products, with an output of over $30,000,000 per year.

Locate your Pacific Coast plant in Los Angeles County, the center of Western industrial expansion. For specific information kindly address—Industrial Department, Los Angeles Chamber of Commerce.

INDUSTRIAL LOS ANGELES COUNTY

Steelworks and Rolling Mills on Pacific Coast

Blast Furnace and Coke Ovens

Columbia Steel Corp.:
Ironton plant, Provo, Utah.—One stack, 83 x 19 feet; four stoves, double-strand pig casting machine; 56 Koppers-Becker by-product coke ovens; by-product recovery plant; Koppers benzol plant.

Steelworks and Rolling Mills

Columbia Steel Corp., Matson Bldg., San Francisco:
Pittsburg works, Pittsburg, Calif.—6 basic open-hearth furnaces; 1 18-inch billet sheet bar mill; 1 12-inch Belgian merchant bar mill; 1 13-inch and 1 9-inch rod mill, Belgian train; 5 black sheet mills, complete wire drawing, nail machine and accessory equipment. Llewellyn mills, Torrance, Calif.—4 basic open-hearth furnaces; 1 5-ton Heroult electric furnace, 1 22-inch billet and bar mill, 1 16-inch roughing, 1 12-inch bar mill, 5 sheet mills.
Portland works, Portland, Oreg.—1 Tropenas 3-ton converter; 1 Greene electric furnace.

Pacific Coast Steel Co., 510 Rialto Bldg., San Francisco:
San Francisco plant, South San Francisco—6 basic open-hearth furnaces, 1 24-inch billet mill, 1 18-inch merchant mill, 1 16-inch and 1 12-inch merchant mill, 1 12-inch Belgian roughing mill and 1 9-inch finishing merchant mill; concrete bar fabricating plant; transmission tower fabricating plant.
Seattle plant, Youngstown, Seattle—4 basic open-hearth furnaces; 1 22-inch billet structural and bar mill with interchangeable universal plate mill housing; 1 16-inch combination merchant mill; 1 9-inch merchant mill.

Southern Pacific Co., San Francisco:
Southern Pacific shops, Sacramento, Calif.—1 6-ton Heroult electric furnace; 2 18-inch bar mills; 2 12-inch bal mills; 12 steam hammers; 1 steam hydraulic press; bolt, nut and rivet department.

Union Tool Co., Torrance, Calif.;
1 3-ton and 1 6-ton Heroult electric furnace; 1 500-ton and 1 1200-ton forging presses.

Judson Mfg. Co., San Francisco:
Plant at Emeryville, Calif.—3 30-ton basic open-hearth furnaces, billet mill and bar mills.

Enterprise Foundry Co., San Francisco:
Works at South San Francisco.—1 basic open-hearth furnace, 2 1-ton electric furnaces for forging ingots.

Southern California Iron & Steel Co., Huntington Park, Calif.:
(Controlled by Pacific Coast Steel Co.)
Works at Vernon, Calif.—3 basic open-hearth furnaces, 1 20-inch billet and bar mill, 1 16-inch break-down mill; 1 12-inch bar mill; 1 hydraulic forging press; bolt, nut and rivet department.

Lamb Machine Co., Hoquiam, Wash.:
1 1½-ton Greene electric furnace making steel ingots and castings for own use.

United Steel Co., Everett, Wash.:
Works at Lowell, Wash.—1 reheating furnace and 1 12-inch merchant bar mill; (now idle).

Utah Steel Corp., Midvale, Utah:
2 basic open-hearth furnaces; 1 22-inch billet mill; 1 16-inch bar mill and 1 10-inch guide mill.

Northwest Steel Rolling Mill, Seattle:
1 electric furnace, reheating furnaces, 1 16-inch and 1 10-inch Belgian mills.

Nov. 22, 1922 of the Columbia Steel Corp.—a merger of the Columbia Steel Co. and the Utah Coal & Coke Co.—work was begun on a blast furnace plant at Provo, Utah. Simultaneously a by-product coke plant with 33 Koppers-Becker coke ovens was started, The furnace receives hematite ore from the company's own mine at Ironspring, the annual capacity of which is about 364,000 tons. The capacity of the coal mines at Columbia is about 350,000 tons annually. In connection with the by-product coke plant, the company operates a by-product recovery plant and a Koppers benzol plant. Since the initial installation was completed, 23 additional ovens of the Koppers-Becker type have been added.

At the present time there are ten steel works on the Pacific coast engaged in the production of steel ingots. Their aggregate capacity is roughly 500,000 tons annually. As in the case of practically all other industrial activity, these steel works are segregated in three localities. As shown in the accompanying table, the steel ingot producing capacity in the Los Angeles district includes the furnaces of the Southern California Iron & Steel Co. at Vernon, Calif., the Columbia Steel Corp., and the Union Tool Co. at Torrance, Calif. In the San Francisco district, the steel ingot producing units are those of the Judson Mfg. Co., Emeryville, Oakland, Calif.; Columbia Steel Corp., Pittsburg, Calif., Southern Pacific Co., Sacramento, Calif.; and the Pacific Coast Steel Co. and the Enterprise Foundry Co. at South San Francisco. In the northwest the steel ingot producing capacity is confined to that of the Pacific Coast Steel Co. at Youngstown, a suburb of Seattle, and of the Lamb Machine Co., Hoquiam, Wash.

The principal rolled products into which these ingots are transformed include bars, small shapes, sheets, plates, wire, reinforcing bars, hoops and bands. The detailed record of mills at the various plants is given in the accompanying table.

One of the most extensive producing plants is that of the Columbia Steel Corp., at Pittsburg. Here mills are turning out sheet bars and billets, black and galvanized sheets, merchant bars, rods and plain, galvanized and barbed wire. The manufacture of wire products is conducted on an extensive scale, woven poultry netting, nails of all sizes, brads, carpet tacks, etc., being formed, tumbled, packed and distributed from this plant. The company now is increasing its facilities at Pittsburg by the addition of a continuous rod mill, a 24-inch continuous sheet bar mill, and a tin plate mill capable of turning out 50,000 tons annually. The tin plate mill, which was started on Sept. 12, is expected to be completed on March 11, 1929.

The equipment and practice at Pittsburg are of the highest order. Round

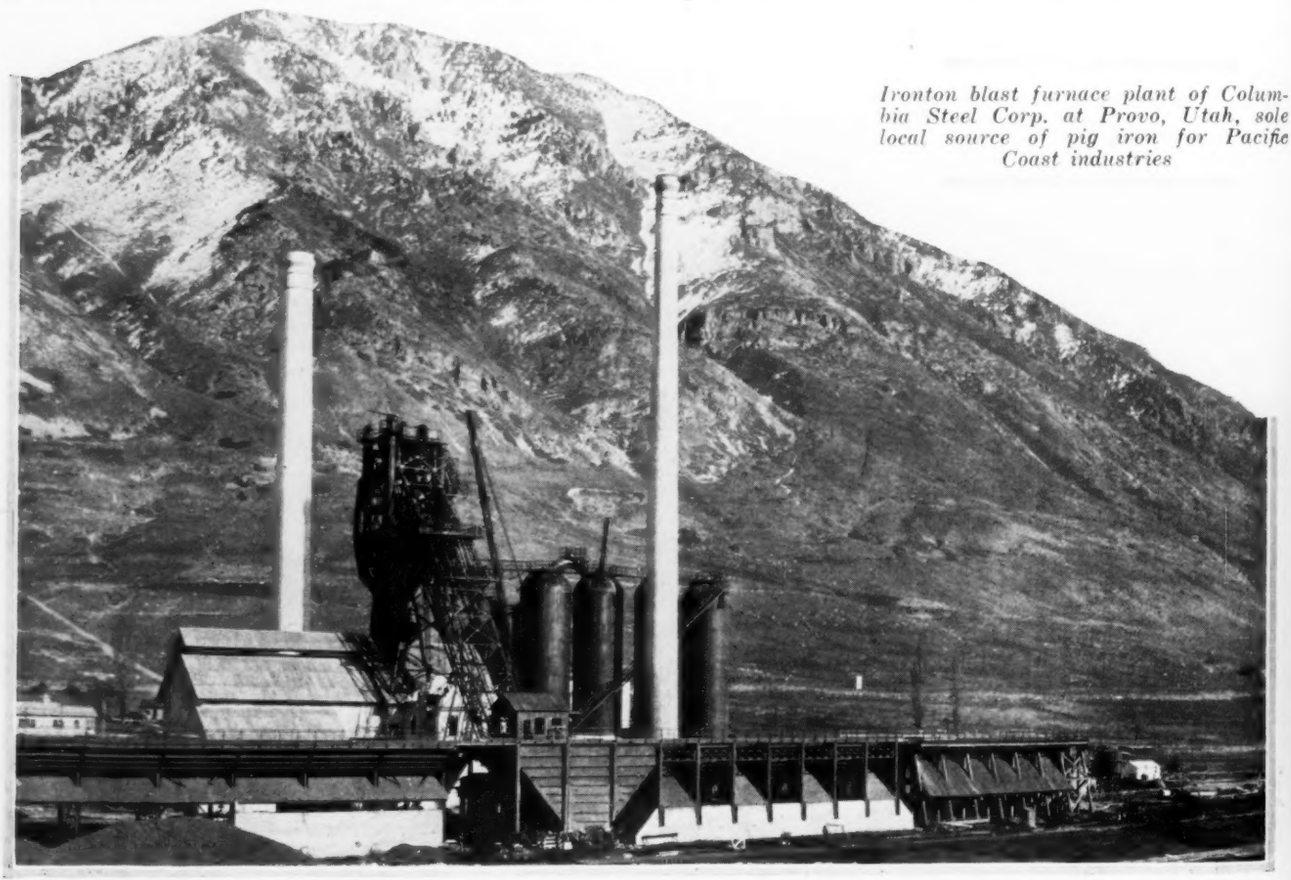
Airplane view of steelworks and rolling mills of Southern California Iron & Steel Co. at Vernon, Calif.

Wire nail department at Pittsburg plant of Columbia Steel Corp.

ingots are used exclusively and all are poured by the bottom-pour method. It has been found that after 90 or 100 ingots have been cast and the mold is worn, a slight cut can be taken on the inner wall to present a new smooth surface.

Owing to the diversity of its products the Columbia Steel Corp. is able to use much of its own steel in its new buildings. Except for the larger structural members, the framework of the building is of Columbia steel shapes, fabricated by fabricators. The sidewalls and roof are of Columbia galvanized corrugated sheets. Much of the equipment for the new mills is being made on the Pacific coast. Some of the bridges for cranes have been fabricated by the Llewellyn Iron Works, Los Angeles, while most of the machine work for the trolleys has been completed by the Columbia Steel Corporation's own shops. A roll turning lathe built by Llewellyn Iron Works recently has been installed at Pittsburg. Housings for the new tin plate mills, were cast in the electric steel foundry of the Columbia Steel Corp. and much of the remaining mill work is being done by local shops.

In South San Francisco the extensive plant of the Pacific Coast Steel Corp. is impressive. Here the principal products are billets, sheet bars, shapes, merchant and concrete bars, hoops and bands. The concrete bar mill has been extended so that the company now is engaged in the cutting, shaping and fabricating of this product. In the case of the structural mill, the company maintains and operates a complete plant for fabricating electric transmission towers. Specialization in this work has permitted this company to win practically all of the transmission tower business on the Pacific coast. At the present time the Pacific Coast Steel Co. is engaged in building a modern plant for the manufacture of bolts, nuts and rivets. This will be completed in March, 1929.



Ironton blast furnace plant of Columbia Steel Corp. at Provo, Utah, sole local source of pig iron for Pacific Coast industries

Many Groups Co-operate in Western Metal Congress Program

EAST is East, West is West; and ne'er the twain shall meet," said Kipling, but technically that very thing is about to happen. When the Western Metal congress and Western States Metal and Machinery exposition open in Los Angeles, Jan. 14, a representative group of eastern manufacturers will be present to participate in the sessions and the show.

The congress and exposition are under the auspices of the American Society for Steel Treating, a national technical and educational organization, which has a ten-year record for similar activities east of the Mississippi river. For three years the society has investigated the prospects for a western meeting and show before acquiescing to requests from many sources. The decision to sponsor such an undertaking was prompted by a desire to be of the same service to the metal industries of the West as of the East.

Further justification is found in the fact that manufacture of electrical machinery has tripled in the last five years; that since 1919, the value of products of 1500 foundries has increased from 51 to over 150 million dollars; that in 1926 the Coast imported iron and steel valued at $6,000,000; that sales of new machine tools approximate $5,000,000 annually; and that consumption of iron and steel is 3,000,000 tons per year with an annual increase of 15 per cent.

The congress will open on Monday, Jan. 14 and will continue through Friday, Jan. 18 with technical sessions both morning and afternoon. The Hotel Biltmore will be the headquarters hotel and it is here that morning sessions will be conducted. With the exposition opening each day at noon at the Shrine auditorium, the afternoon sessions will be held there. The program of papers and authors will be found on Page 1660.

Because of the diverse nature of the industries on the coast, a number of local groups and sections of national organizations have been invited to participate in the program. Among those co-operating are: American Society of Mechanical Engineers; American Institute of Mining and Metallurgical Engineers; American Petroleum institute; Institute of Metals; American Welding society; Society of Automotive Engineers; Pacific Coast Electrical association; Pacific Coast Gas association; Institute of Marine Engineers; Metal Trades and Manufacturers' associa-

The Los Angeles Biltmore hotel, where headquarters for the first Western Metal congress will be maintained

AMERICAN SOCIETY FOR STEEL TREATING

EXECUTIVE OFFICES 7016 EUCLID AVE.

CLEVELAND, OHIO

To the
Metal Working Industries
of the Pacific Coast--

Metal--gold--80 years ago, paved the way for the remarkable growth that has taken place on the west coast of our United States.

Metals--ferrous and non-ferrous--are today laying a foundation, even more secure, for a more remarkable development in the years to come.

This new development will not be as long in the building. Months, not years, will measure the growth of this new giant industry of the Pacific Coast.

That is why the American Society for Steel Treating is happy to be identified with the first great event that is to awaken the nation to the great strides that have been made in the metal working industries west of the Rocky Mountains.

As the sponsors of the Western Metal Congress and The Western States Metal and Machinery Exposition, the American Society for Steel Treating wishes to thank the many individuals and firms who have done so much to give to these events the importance they are to assume in the metal world.

And to the following technical societies and associations, who have assisted in the preparation of and will deliver papers during the Western

Metal Congress, the American Society for Steel Treating extends its hearty thanks -

American Society of Mechanical Engineers
American Institute of Mining
and Metallurgical Engineers
California Division American Petroleum Institute
Institute of Metals
American Welding Society
Society of Automotive Engineers
Pacific Coast Electrical Association
Pacific Coast Gas Association
Institute of Marine Engineers
Metal Trades and Manufacturers Association
Chamber of Mines and Oils
National Purchasing Agents Association
American Foundrymen's Association

Without the splendid, unselfish cooperation of these Societies, success could not obtain.

We sincerely hope to have the pleasure of aiding the Pacific Coast metal working industries to the brilliant future which lies before them.

We hope that you will see fit to continue in future years the institutions of the Western Metal Congress and the Western States Metal and Machinery Exposition, which you are launching to such splendid success on this fourteenth of January, 1929.

Thank you!

Yours very truly,

AMERICAN SOCIETY FOR STEEL TREATING

W. H. Eisenman

W. H. Eisenman.
Secretary.

tion; Chamber of Mines and Oils; and National Association of Purchasing Agents.

With oil production and refining one of the major industries along the Pacific coast, considerable attention will be paid to oil-field problems. As a matter of fact, two sessions are to be devoted almost entirely to metallurgical problems, in connection with tool joints, bits, casing failures, etc. Welding is another subject to be much discussed because of the many miles of pipe lines that have been constructed in western territory.

That visitors from the East may have an opportunity to visit industrial plants of the West, a number of Los Angeles manufacturers and those in adjacent territory will conduct visitors through their shops. Probably one of the most interesting of the trips scheduled will be to the Signal Hill oil field at Long Beach. The complete list of plant inspections will be found on Page 1655.

A schedule of entertainment for both men and ladies is being prepared, but aside from a banquet at Hotel Biltmore on Thursday evening, Jan. 17, no announcement has been made.

The Los Angeles chapter of the American Society for Steel Treating is co-operating in the management of the congress and exposition through the following executive committee:

General chairman, Wade W. Hampton, Hughes Tool Co.; general secretary, H. V. Ruth, Ducommon Corp.; exhibits, C. H. Fromme, Axelson Machine Co.; program, W. H. Laury, Axelson Machine Co.; publicity; T. S. Hutton, Electric Steel & Mfg. Co.; transportation and plant inspection; W. W. Farrar, E. F. Houghton & Co.; information and registration; C. A. Stiles, Lacy Mfg. Co.; entertainment; J. H. Knapp, James H. Knapp Co.; and attendance; M. B. Pendleton, Plomb Tool Co.

Exposition Hours

Monday, Jan. 14—12 *m. to* 10 *p.m.*

Tuesday, Jan. 15—12 *m. to* 10 *p.m.*

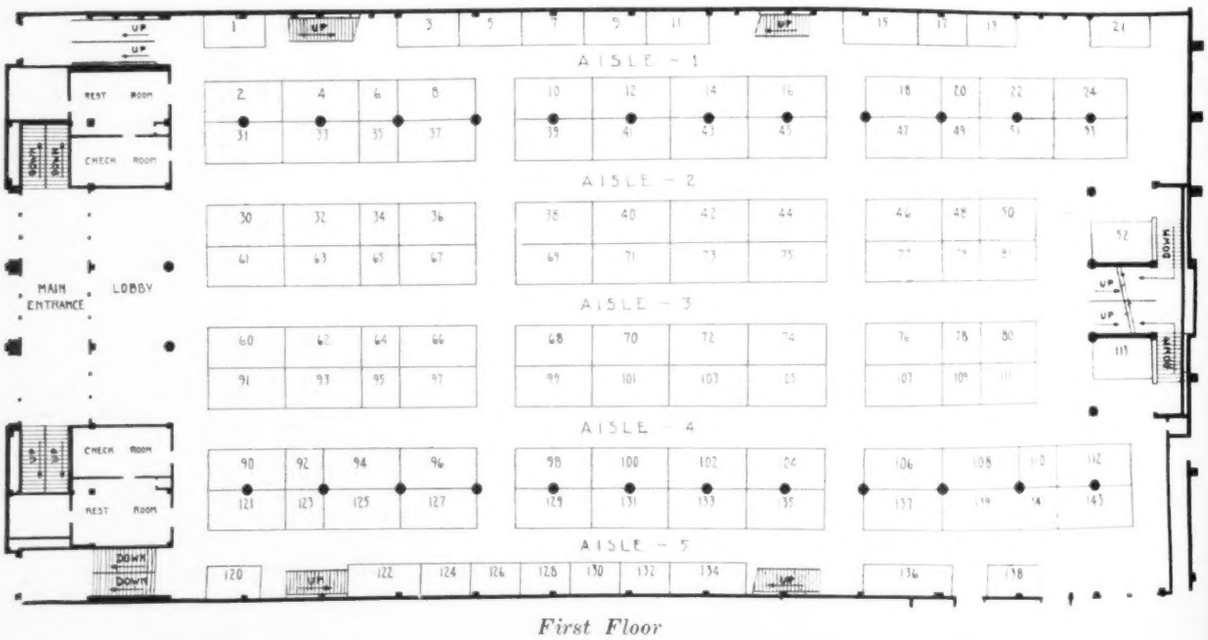
Wednesday, Jan. 16—12 *m. to* 10 *p.m.*

Thursday, Jan 17—12 *m. to* 6 *p.m.*

Friday, Jan. 18—12 *m. to* 10 *p.m.*

Alphabetical List of Exhibitors Who Will Show

Exhibitor	Space No.
Abrasive Co.	315
Aeronautical World	235
Ahlberg Bearing Co. of California	—
Air Reduction Sales Co.	328, 330
Ajax Electrothermic Corp.	249
American Brass Co.	282
American Car & Foundry Co.	98
Armstrong-Blum Mfg. Co.	301
Armstrong Bros. Tool Co.	303
Atkins, E. C., & Co.	281
Atlas Steel Corp.	35
Axelson Machine Co.	50, 284
Bausch & Lomb Optical Co.	122
Bethlehem Steel Co.	106, 108, 137, 139
Bignall & Keeler Machine Works	250
Black & Decker Mfg. Co.	286
Bliss, E. W., Co.	250
Botfield Refractories Co.	68
Bristol Co.	312
Brown Instrument Co.	100
Buffalo Forge Co.	252
Bureau of Power and Light	47
California Malleable Casting Co.	92
Calorac Electric Corp.	249
Campbell, Andrew C., Inc.	250
Carborundum Co.	300, 302
Central Alloy Steel Corp.	74, 105
Chicago Steel & Wire Co.	125
Clark Tructractor Co.	201
Cleveland Twist Drill Co.	280
Colonial Steel Co.	99
Cooper Hewitt Electric Co.	33
Crucible Steel Co. of America	61
Daily Metal Trade	79
Dalton Tool & Machine Co.	305
Dearborn Chemical Co.	95
Dings Magnetic Separator Co.	249
Disston, Henry, & Sons Inc.	51
Doheny Stone Drill Co.	36, 67
Ducommon Corp.	42, 44
Eason & Therolf Tool Co.	6
Eastman Kodak Co.	134
Electric Steel & Mfg. Co.	41
Electrical Refractories Co.	249
Elwell-Parker Electric Co.	136
Ex-Cell-O Tool & Mfg. Co.	75
Federal Machine & Welder Co.	285
Firth-Sterling Steel Co.	45
Ford, J. B., Co.	71
Gairing Tool Co.	73
Gathmann Engineering Co.	80
General Electric Co.	253
Globar Corp.	300, 302
Goddard & Goddard Co.	91
Grant Mfg. & Machinery Co.	270
Hagan, George J., Co.	216
Halcomb Steel Co.	30
Hardinge Bros. Inc.	250
Haynes Stellite Co.	32
Heppenstall Forge & Knife Co.	96
Herberts Machinery & Supply Co.	270, 305
Hisey-Wolf Machine Co.	250
Horton, E., & Son Co.	303A
Houghton, E. F., & Co.	10, 39
Hughes Tool Co.	62
IRON TRADE REVIEW	79
Johns-Manville Co.	135
Johnson Gear Co.	81
Jorgensen, Earle M., Co.	108
Kay-Brunner Steel Casting Co.	107
Keese Engineering Co.	33
Kelly Reamer Co.	40
Knapp, James H., Co.	—
Krupp Nirosta Co.	8
L. A. Automotive Works	104
Laidlaw, William, Inc.	272



First Floor

Diversified Products in Metal Show

Eastern and Western Manufacturers Join Hands in First Metal and Machinery Exposition To Be Conducted on the Pacific Coast

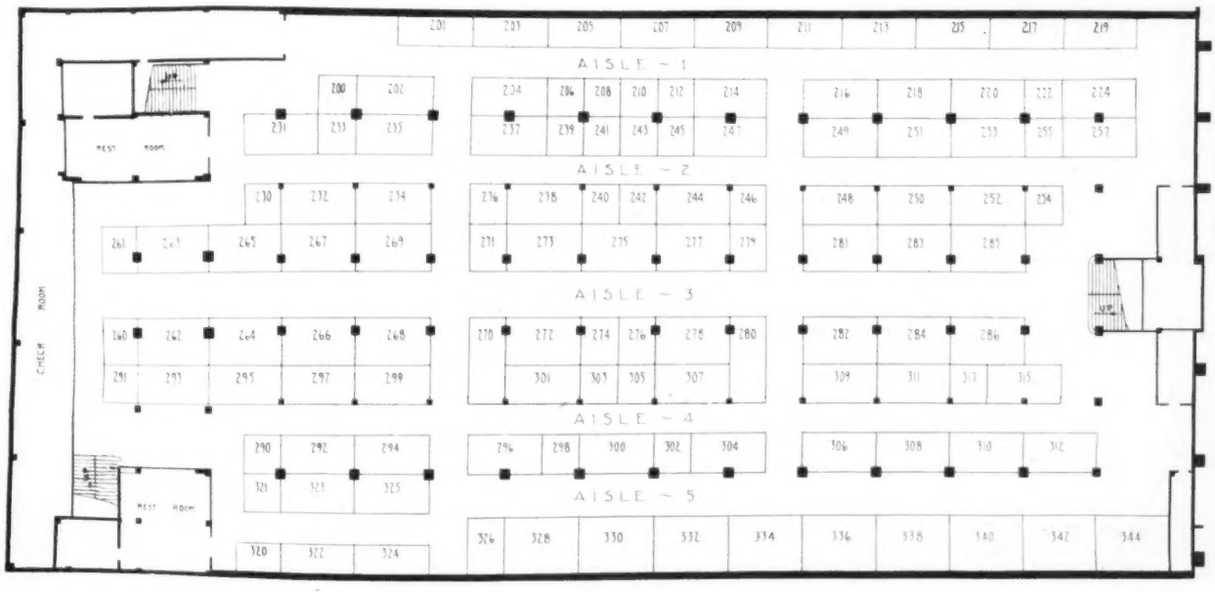
MORE than 150 manufacturers and sales representatives of metal products and metalworking or treating equipment will occupy space in the Western States Metal and Machinery exposition which in the Shrine auditorium, Los Angeles, on Jan. 4 opens its doors to Pacific coast industry. For the first time a national technical society is providing for the western section of the United States the privileges enjoyed by eastern territory for more than a decade.

In running down the list of exhibitors, it is rather interesting to note that perhaps two-thirds are corporations engaged in selling from coast to coast, although situated in the Middle West or East; while the other third is located and operates in Pacific states.

This exposition will embrace the metal industry from raw material to finished product. Steel companies will show the various grades of raw stock from and by which products are made; machine tools using high-grade improved tools will demonstrate the fabrication of raw materials; then comes heat treating where the latest supplies and heat treating equipment for gas, oil and electricity will be shown in actual operation. Inspection and testing equipment completes the cycle, while within the circle we find such sections of the exhibit as foundry equipment and supplies, material handling equipment, welding and cutting, oil field tools and equipment, cutting

Products at the Western States Metal Exposition

Exhibitor	Space No.
Landis Machine Co.	272
LaSalle Tool Co.	276
Leeds & Northrup Co.	246, 279
Leitz, E., Inc.	93
Lincoln Electric Co.	111
Linde Air Products Co.	63, 65
Ludlum Steel Co.	69
Machinist Tool & Supply Co.	271
Masterson, Joseph A., & Co.	127
McGill Metal Co.	127
Merco Nordstrom Valve Co.	109
Merit Oil Equipment Co.	305A
Mettler, L. B., Co.	308
Minerals & Metals Corp.	120
Morse Twist Drill & Machine Co.	126
Myers Machinery Co.	304
National Twist Drill & Tool Co.	273
New Departure Mfg. Co.	60
Niagara Machine & Tool Works	272
Norma-Hoffmann Bearings Corp.	127
Northwestern Mfg. Co.	275
Nutall, R. D., Co.	66
Oakite Products Inc.	18
Oil Age	233
Oil Bulletin	255
P. L. & N. Co.	43
Pacific Abrasive Supply Co.	300, 302
Pacific Factory	11
Pangborn Corp.	37
Peerless Machine Co.	274
Peir, A. H., Co.	111
Pels, Henry, & Co.	270
Penton Publishing Co.	79
Perfect Caster Mfg. Co.	141
Petroleum World	17
Plomb Tool Co.	48
Purox Co.	275
Regan Forge & Engineering Co.	—
Rhodes Mfg. Co.	305
Rockford Machine Tool Co.	272
Rotor Air Tool Co.	250
Savage, W. J., Co. Inc.	270
Sidney Machine Tool Co.	250
Simonds Saw & Steel Co.	315
Sleeper & Hartley Inc.	102
Smith-Booth-Usher Co.	250, 252, 281
Snyder Foundry Supply Co.	37
Sonntag Co.	304
Southern California Edison Co.	—
Southern California Gas Co.	338, 340
Spencer Turbine Co.	310
Spindler & Sauppe	93
Standard Oil Co. of California	76, 77
Standard Tool Co.	103
Steel Publications	34
Sterling Electric Motors Inc.	49
Stoody Co.	275
Strand, N. A., & Co.	123
Sutor & Co.	98
Timken Steel & Tube Co.	38
Union Drawn Steel Co.	277
U. S. Electrical Mfg. Co.	165
Vanadium Corp. of America	46
Vernon Foundries	304
Victor Oxyacetylene Equipment Co.	342
Welding Engineer Publishing Co.	128
West Coast Pipe & Steel Co.	64
Western Drop Forge Co.	—
Western Machinery World	2
Westinghouse Electric & Mfg. Co.	66, 97
Whitman Barnes-Detroit Corp.	70
Wilcox, E. A., Co.	216, 249, 251
Wilson-Maeulen Co.	94
Wilson Welder & Metals Co.	250
Wisconsin Electric Co.	313
Young Bros. Co.	261



Ground Floor

The

BETHLEHEM EXHIBIT

Booths

106, 108, 137 and 139

at the

Western States Metal and Machinery Exposition

Los Angeles, Calif.

January 14th to 18th, inclusive

Representative Products of Bethlehem Steel Company

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices:
New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco
Los Angeles Seattle Portland Honolulu

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of our Commercial Products

BETHLEHEM

W. W. HAMPTON

Chairman of the Los Angeles chapter of the American Society for Steel Treating and general chairman of the Western Metal congress and exposition committee

tools, small tools and machinist supplies, nonferrous metals, castings, forgings, abrasives, refractories, ball bearings, motors, oils, belting. proofing and many other lines.

Following is a detailed list of products to be shown and the names of company representatives:

ABRASIVE CO., Philadelphia—Products will consist of grinding wheels, segments, bricks and stones of borolon and electrolon. Snagging of steel castings will be demonstrated. G. I. Fischer will be in charge.

AHLBERG BEARING CO. OF CALIFORNIA, Los Angeles—Bearings and a process for regrinding bearings will be shown at this company's booth. In attendance will be: W. C. Fries, C. A. Fagan, G. T. Bell, F. C. Griffin, W. D. Lanke and J. J. Clapp.

AIR REDUCTION SALES CO., New York—Will exhibit and demonstrate a motor-driven portable machine for oxyacetylene cutting of steel plates, forgings, billets, risers, etc.; a new and larger machine with structural improvements for cutting light and heavy sections and production shapes; another new machine with cutting area extended for reproduction cutting of shapes from steel plates; hand welding and cutting equipment; cylinders of oxygen and acetylene; and examples of work welded and cut with oxyacetylene. Representatives will include: D. J. Williams, H. P. Etter, Harold Saunders, C. B. Leahy and B. Llewellyn.

AJAX ELECTROTHERMIC CORP., Trenton, N. J.—This company will operate a high-speed induction heat treating furnace. Represented by E. A. Wilcox Co.

AMERICAN BRASS CO., Waterbury, Conn.—Will demonstrate oxyacetylene welding of cast iron and steel using tobin bronze and other welding rods. Products to be displayed will include welding rods; manganese-silicon bronze adaptable to forging, welding, brazing, casting, machining and forming of plates, sheets, rods, wire, tubes, pipe, hot pressed parts, bolts, nuts, screws, nails, etc.; and products welded with bronze. A. W. Gruss, W. C. Swift, E. P. Hammond and G. T. Piersol will be in attendance.

AMERICAN CAR & FOUNDRY CO., New York—Equipment to be operated will include a two-electrode electric rivet heater and a one-electrode machine for heating stock for forging or upsetting. F. C. Cheston will be the representative.

ARMSTRONG-BLUM MFG. CO., Chicago—A metal band sawing machine, automatic high-speed saws, hack sawing machines and high-speed hack saw blades will be shown in operation. F. J. Blum and J. C. Fletcher will represent the company.

ARMSTRONG BROS. TOOL CO., Chicago—Constituting this company's display will be lathe, planer and shaper tools; lathe dogs; drop-forged C-clamps and wrenches; ratchet drills; and pipe tools. In attendance will be Horace Armstrong and J. C. Fletcher.

ATKINS, E. C., & CO., Indianapolis—Shown in operation will be metal-cutting band and hack saw machines; hack saw blades; metal cutting slitting saws; circular and band saws for cutting wood; and machine knives. Represented by Smith-Booth-Usher Co.

ATLAS STEEL CORP., Dunkirk, N. Y.—Products on display will be hot-rolled tool steel sections; cold-drawn products; stainless steel products; fractures of tool steels; high-speed steel forgings, and various tools and dies. Representatives will be C. P. Burgess and A. J. J. Ross.

AXELSON MACHINE CO., Los Angeles—Will exhibit lathes, oil field pumps and sucker rods. Carl Fromme will be in charge.

BAUSCH & LOMB OPTICAL CO., Rochester, N. Y.—This manufacturer will demonstrate a metallographic equipment with wide field attachment; illuminating lamps for metallographic and microscopic work in general; contour measuring projector; toolmaker's microscope; wide-field binocular microscope; binocular magnifier; focal illuminators, magnifiers and readers. George Rhode and W. W. Johnstone will be in charge.

BETHLEHEM STEEL CO., Bethlehem, Pa.—This exhibit will be composed of alloy steels, sheet and tin plate, wire products, forgings and castings, structural shapes, pig iron, stainless steel and tool steels; also special products such as railway trackwork, industrial and mine ties, rolled steel car wheels and forged steel axles. W. R. Shimer, Robert MacDonald and W. B. Pritchard will attend.

BIGNALL & KEELER MACHINE WORKS, Edwardsville, Ill.—Pipe cutting and threading machines will make up the display of this exhibitor. Represented by Smith-Booth-Usher Co.

BLACK & DECKER MFG. CO., Towson, Md.—Portable electric drills and grinders; bench and pedestal grinders and buffers; electric hammers, sanding machines, screw drivers, socket wrenches and tapping machines will comprise the display of this company. Representatives will be M. A. Johnson, A. W. Helbusch, F. F. Maley, James Smith, P. O. Watts, R. D. Black and W. C. Allen.

BLISS, E. W., CO., Brooklyn, N. Y.—Inclinable power presses made by this company will be shown. Represented by Smith-Booth-Usher Co.

W. H. LAURY

Chairman of the program committee for the Western Metal congress

BOTFIELD REFRACTORIES CO., Philadelphia—Will exhibit fire brick bonded with special cement and fines; and a fire brick structure surfaced with cement by a gun. Axel H. Engstrom will be in charge.

BRISTOL CO., Waterbury, Conn.—Equipment to be shown in operation will comprise automatic temperature controllers; pyrometer for furnace control; automatic valves connected to pyrometers; control panels; recording and indicating pyrometers.

BROWN INSTRUMENT CO., Philadelphia—A complete line of temperature measuring instruments will be demonstrated in this company's booth. Mr. Godfrey will be in charge.

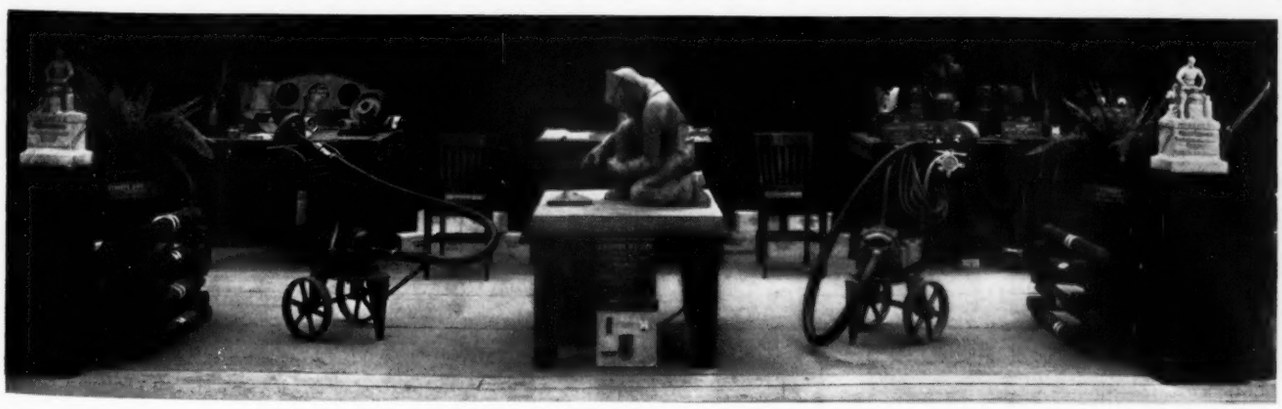
BUFFALO FORGE CO., Buffalo—This manufacturer will show its line of blowers, shears and punch presses. Represented by Smith-Booth-Usher Co.

BUREAU OF POWER AND LIGHT, Los Angeles—Statistics on Los Angeles as an industrial center with photographs of electrical installations will be displayed by this city department. Messrs. Dye and Elliott will be in charge.

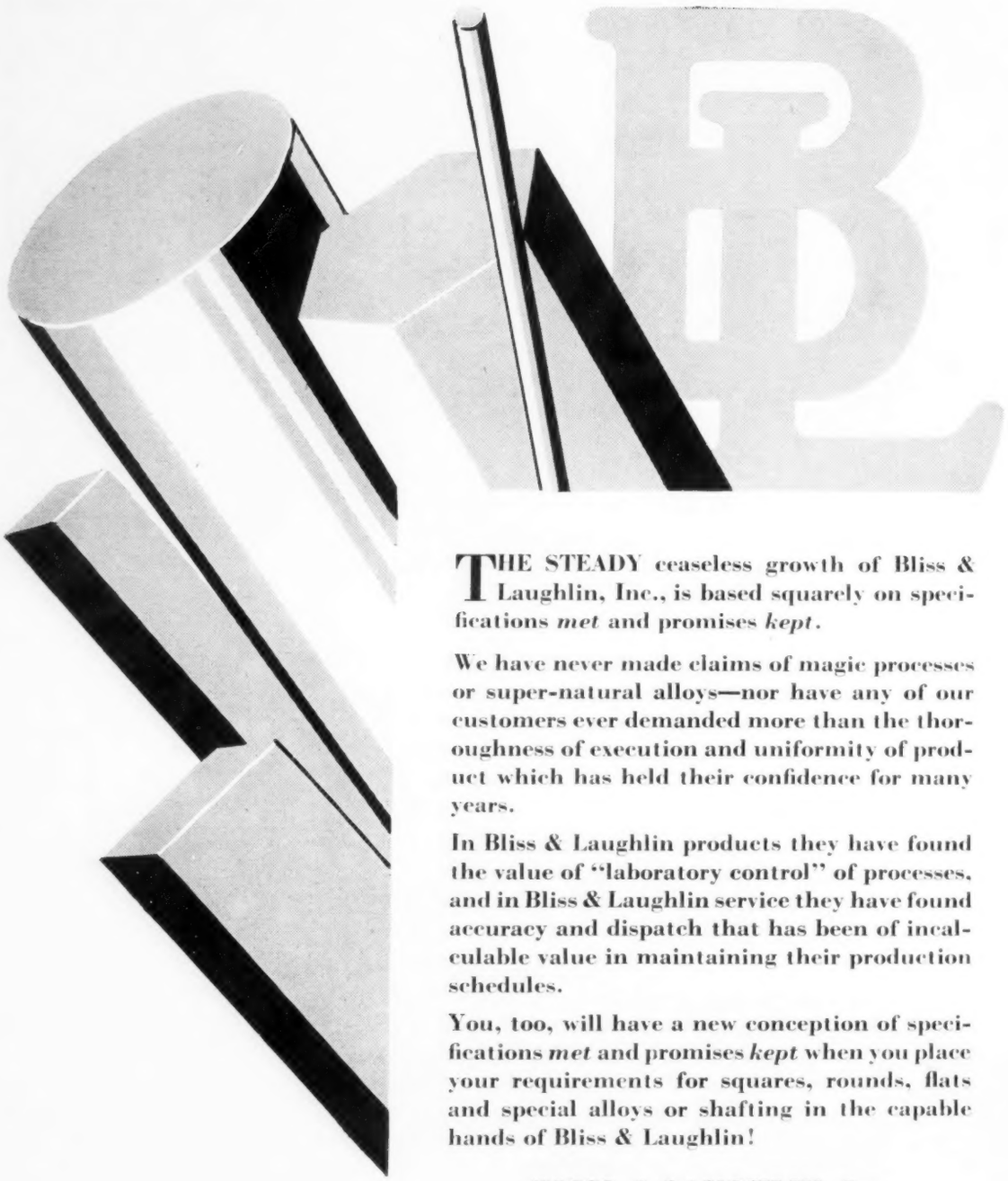
CALIFORNIA MALLEABLE CASTING CO., Los Angeles—Malleable castings of various sizes and types will be exhibited by this manufacturer. A. C. Denman and F. R. Edmunds will be the representatives.

CALORAC ELECTRIC CORP., New York—An electric rivet heater and ring heater will be shown by this manufacturer. Represented by E. A. Wilcox Co.

CAMPBELL, ANDREW C., INC., Bridgeport, Conn.—Nibbling machines for cutting sheets and plates up to $\frac{3}{8}$-inch thick will be



The Stoody Co., manufacturer of welding rods and accessories, has prepared this interesting display. The figure in the center is a miniature welder striking an arc on an airplane tail skid



THE STEADY ceaseless growth of Bliss & Laughlin, Inc., is based squarely on specifications *met* and promises *kept*.

We have never made claims of magic processes or super-natural alloys—nor have any of our customers ever demanded more than the thoroughness of execution and uniformity of product which has held their confidence for many years.

In Bliss & Laughlin products they have found the value of "laboratory control" of processes, and in Bliss & Laughlin service they have found accuracy and dispatch that has been of incalculable value in maintaining their production schedules.

You, too, will have a new conception of specifications *met* and promises *kept* when you place your requirements for squares, rounds, flats and special alloys or shafting in the capable hands of Bliss & Laughlin!

BLISS & LAUGHLIN, Inc.
Mills and General Offices: Harvey, Ill.
Chicago Warehouse, 1023-27 W. Jackson Blvd.
Sales offices in all principal cities

A. M. CASTLE & CO. Los Angeles
A. M. CASTLE & CO. San Francisco
A. M. CASTLE & CO. Seattle

BLISS & LAUGHLIN, INC.

Cold Drawn Steels

Turned *and* Polished Shafting

QUALITY & SERVICE SINCE 1891

demonstrated by this manufacturer. Represented by Smith-Booth-Usher Co.

CARBORUNDUM CO., Niagara Falls, N. Y. —This exhibit will consist of carborundum and aloxite grinding wheels, polishing grains, cloth and other abrasive products. Represented by Pacific Abrasive Supply Co.

CARBORUNDUM CO., Perth Amboy, N. J. —The display in this booth will include one visual furnace lined with the company's refractory materials, model of a wire annealing furnace, model of car-type annealing furnace, model of recuperator, all built by the company; also refractory brick, hearths, tile and cements. Represented by Pacific Abrasive Supply Co.

CENTRAL ALLOY STEEL CORP., Massillon, O.—Alloy steels, stainless irons, copper-molybdenum iron and nitralloy will make up products shown by this company. Representatives will include J. M. Schlendorf, A. J. Wilson, L. S. Hamaker, R. C. Lea and A. Carrigan Jr.

CHICAGO STEEL & WIRE CO., Chicago—Novel forms of welding, including arc welding of sheet steel as thin as 30-gage, arc welding of aluminum, high-speed pipe welding, abrasive resisting welding, super-strength welding and arc welding of stainless steel. Displayed also will be welding rods, welding generators and portable gasoline-engine driven welding outfits. In attendance will be J. B. Green, F. B. Toombs, Dana Summers, R. W. Holt, A. W. Courtney, R. O. Waldman, A. C. Eck, C. T. Price, J. E. Brower and J. W. Faux.

CLARK TRUCTRACTOR CO., Battle Creek, Mich.—A 3-ton gasoline-propelled industrial lift truck; a small three-wheeled gasoline industrial tractor; and 1-ton steel trailer equipped with universal coupler and rubber tires will comprise the equipment in this company's booth. R. J. Burrows, E. B. Clark Jr. and H. J. Mayo will be in charge.

CLEVELAND TWIST DRILL CO., Cleveland—A complete line of twist drills and a high-speed drill press demonstrating the cutting of drills in various materials at high speeds and feeds will comprise the display of this manufacturer. Representatives will be J. G. Ladrick and H. M. Anderson.

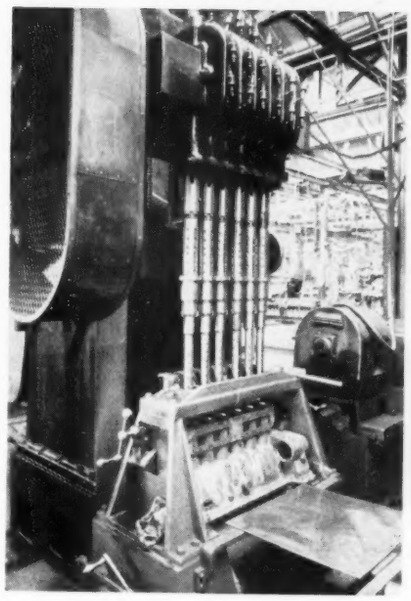
COLONIAL STEEL CO., Pittsburgh—This company will show various shapes of high-speed and carbon tool steels and tools made from them; raw material used in manufacture of tool steel and fractures resulting from various heat treatments; samples of hollow and solid mining drill steel; agricultural steels; jail bar and safe steels; and die blocks. A. J. Hede and B. Taylor Altman will be in charge.

COOPER HEWITT ELECTRIC CO., Hoboken, N. J.—Modern industrial lighting equipment and products manufactured under this system of illumination will constitute the display in this booth. Represented by Keese Engineering Co.

CRUCIBLE STEEL CO. OF AMERICA, New York—Will display illuminated photographs of

A. E. DEBRUN

Chairman of program committee of Los Angeles section of the American Welding society and member of the Western Metal congress program committee



A cylinder semifinishing operation in the automotive industry. Equipment for this purpose will be shown by the Kelly Reamer Co.

its various plants; finished tools; high-speed dies; oil-hardening tool steels; stainless steel; acid and heat resisting steels; hollow and solid drill collars, tool joints, etc. Representatives will include J. A. Ward, J. W. May, A. E. Perkins, H. G. Bain, F. G. Bodin, P. F. Harris and C. F. Livermore.

DAILY METAL TRADE, Cleveland—At this booth will be available copies of publications of the Penton Publishing Co. and technical books. The space will be fitted up as a restroom and all who attend the exposition are cordially invited to make their headquarters here. Representatives will be: J. D. Pease, E. F. Ross, Don Partridge and R. C. Hill.

DALTON TOOL & MACHINE CO., New York—Several small lathes will be shown by this manufacturer. Represented by Herberts Machinery & Supply Co.

DEARBORN CHEMICAL CO., Chicago—Comprising this display will be chemically compounded rust preventives, powdered and liquid cleaners. E. M. Converse will be in charge.

DINGS MAGNETIC SEPARATOR CO., Milwaukee—Two types of magnetic separators built by this manufacturer will be shown. Represented by E. A. Wilcox Co.

DISSTON, HENRY, & SONS INC., Philadelphia—This exhibit will consist of a cut-off saw, a metal saw and hack saw machine in operation; also a display of high-speed hack saws, files and steels. Included in those attending will be H. A. Baxter, Edward Ludy, A. A. Gardner and G. T. Crandall.

DOHENY STONE DRILL CO., Los Angeles —A complete line of oil-field tools will be shown in the manufacturer's booth. William Grau and Fred Arnold will be in charge.

DUCOMMON CORP., Los Angeles—The display of this exhibitor will include steel products manufactured by Midvale Steel Co., and grinding wheels manufactured by Norton Co.; also a line of steel products made by other manufacturers. In attendance will be J. E. Webster, H. V. Ruth, E. H. Shoemaker, H. E. Howard and S. E. Tiberg.

EASON & THEROLF TOOL CO., Los Nietos, Calif.—All-steel self-cleaning valves for slush pumps for oil field service will be displayed in this company's booth. Representatives present will be E. L. Eason Jr., H. L. Therolf, Roy Reynolds and R. E. Gillespie.

EASTMAN KODAK CO., Rochester, N. Y.—The exhibit of this company will consist of X-ray negatives showing defects in steel castings and in various assembled products. E. E. Smith will be in attendance.

ELECTRIC STEEL & MFG. CO., Los Angeles —Electric steel castings and special alloy castings will make up the exhibit of this manufacturer. T. H. Hutton will be in charge.

ELECTRICAL REFRACTORIES CO., East Palestine, O.—Refractory heating element supports used in construction of electrical furnaces, ranges and heating devices will be shown by this company. Represented by E. A. Wilcox Co.

ELWELL-PARKER ELECTRIC CO., Cleveland—This company will demonstrate electric storage-battery trucks for industrial application. Ira G. Perin will be in charge.

EX-CELL-O TOOL & MFG. CO., Detroit—Standard drill jig bushings, precision internal grinder spindles, diesel engine fuel pump details, aircraft engine precision details and miscellaneous specimens of precision internal grinding and lapping will be demonstrated in the booth of this company. W. F. Wise will be in attendance.

FEDERAL MACHINE & WELDER CO., Warren, O.—Equipment and machinery for electrical spot welding will comprise the equipment shown by this company. Represented by Smith-Booth-Usher Co.

FIRTH-STERLING STEEL CO., McKeesport, Pa.—Included in the products to be shown at this booth will be a new tungsten-carbide cutting alloy; high-speed tool steel; oil-hardening die steel; hot work, chisel and punch steels; and a line of stainless steels and articles made from it. These who will attend are: D. G. Clark, O. K. Parmiter, W. E. Nelson, W. H. Davis, C. I. Christie, L. W. Mead, C. D. Moore and Joseph Smith.

FORD, J. B., CO., Wyandotte, Mich.—Samples of chemicals used in the cleaning of metals prior to finishing operations, also samples of work cleaned with cleaners made by this company will be exhibited. B. N. Goodell, S. H. Renton, William LaRocque and R. Talley will attend.

GAIRING TOOL CO., Detroit—The display in this booth will consist of multiple-operation standard and special cutting tools and tool holders, featuring solid and insert blade types. Included will be a new nose-drive reamer; a new full-floating holder for taps; reamers, etc.; counterbore sets; offset spot facing heads; chucking reamers; grinding fixtures for sharpening cutters; counterbores and core drills and a new multiple boring head. Representatives will include C. E. Wyrick, B. O'Meara and Evan Evans.

GATHMANN ENGINEERING CO., Baltimore—Ingots, ingot molds, shrinkhead casings and improved methods of steel production will be shown at this company's booth. Mark Gathmann will be in charge.

GENERAL ELECTRIC CO., Los Angeles—Demonstrated by this company will be a 45-kilowatt 3-phase electric furnace of the resistor type; a motor-generator arc welder; and an atomic hydrogen welding equipment. E. J. Cipperly will be in attendance.

GLOBAR CORP., Niagara Falls, N. Y.—Featuring the display of this company will be a furnace equipped with nonmetallic electrodes and operating at forging temperature. Several domestic appliances equipped with the same type of elements also will be shown. Represented by Pacific Abrasive & Supply Co.

GODDARD & GODDARD CO., Detroit—Equipment which will make up the display in this booth will be standard and special milling cutters of both the profile and form types; thread-

C. H. FROMME

Chairman of the exhibit committee of the Western States Metal and Machinery exposition

W. W. FARRAR

Chairman of plant inspection committee of Western Metal congress

ing hobs; slabbing cutters for side and main rod work in railroad shops and locomotive tape reamers; and helical mills. Representing the company will be A. N. Goddard and S. F. Sides.

GRANT MFG. & MACHINERY CO., Bridgeport, Conn.—A vibrating-type riveter and a rivet spinning machine will be demonstrated in this company's booth. Represented by Herberts Machinery & Supply Co.

HAGAN, GEORGE J., CO., Pittsburgh—A portable electric furnace suitable for all heat treating operations; also complete information covering the company's line of oil, gas, electric and coal-fired heat treating furnace equipment will comprise the display in this booth. Represented by R. E. Talley and E. A. Wilcox Co.

HALCOMB STEEL CO., Syracuse, N. Y.—Constituting this exhibit will be tool steels and tool steel products and sheets and bars of heat and corrosion resisting steels. Representatives will be H. A. Pardee and A. A. Westcott.

HARDINGE BROS., INC., Chicago—Bench precision machinery will constitute the line of equipment shown in this booth. Represented by Henry Nelson and Smith-Booth-Usher Co.

HAYNES STELLITE CO., Kokomo, Ind.—Stellite products and parts stellited to resist abrasion and wear will make up this company's exhibit. Stellited oil well drilling tools will be a feature. At stated times each day the application of stellite to base metals with the oxyacetylene torch will be demonstrated.

HEPPENSTALL FORGE & KNIFE CO., Pittsburgh—Comprising this display will be three split ingots of 24, 18 and 10 inches diameter showing uniformity and quality of steel produced in 18-ton acid open-hearth furnaces; shear knives for cutting steel; and drop forging die blocks. The company's representatives will be D. A. Stuart, S. C. Stiner and M. C. Ryer.

HERBERTS MACHINERY & SUPPLY CO., Los Angeles—See listings under the following heads: Henry Pels & Co.; Peerless Machine Co.; Niagara Machine & Tool Works; LaSalle Tool Co.; Rhodes Mfg. Co.; William Laidlaw Inc.; Grant Mfg. & Machine Co.; Landis Machine Co.; W. J. Savage Co. Inc.; Rockford Machine Tool Co.; Dalton Tool & Machine Co.; Merit Oil Equipment Co.; and E. Horton & Son Co. Representatives will be V. C. Wear, S. W. Clawson, Earl Marshall, H. T. King, M. F. Strauss, R. L. Moore, P. S. Taylor, E. C. Chesebrough, W. H. Kirby and D. N. Macconel.

HISEY-WOLF MACHINERY CO., Cincinnati—Portable electric tools including drills, lathes, grinders and buffers, will make up this display. Represented by Smith-Booth-Usher Co.

HORTON, E., & SON CO., Windsor Locks, Conn.—Wrenchless chucks are to be demonstrated by this manufacturer. Represented by Herberts Machinery & Supply Co.

HOUGHTON, E. F., & CO., Philadelphia—Included in the exhibit of this company will be carburizing materials, quenching oils, salts, leather belting, leather packings, rust preventives and lubricating oils. Those who will attend are J. A. Brittain, C. G. Shultze, G. S. Rogers, R. D. Africa, R. C. Holtslander, O. J. Ulrich, Rex Delong, O. L. King, W. W. Farrar, F. A. Giersch, L. D. Morrell, G. B. Farnsworth and James Brittain.

HUGHES TOOL CO., Los Angeles—Oil field tools will be on exhibition in this booth. Wade Hampton will be the company's representative.

IRON TRADE REVIEW, Cleveland—This booth will be fitted up as a restroom, which those attending the exposition are invited to make their headquarters. Copies of publications of the Penton Publishing Co. and technical books will be available. Representatives will be J. D. Pease, E. F. Ross, Don Partridge and R. C. Hill.

JOHNS-MANVILLE CO., San Francisco—A complete line of insulating and heat resisting materials will be exhibited by this manufacturer. Guy A. Barker will be in charge.

JOHNSON GEAR CO., Berkeley, Calif.—A new Comet-type airplane motor and a complete line of gears will be displayed by this company. F. B. Drake will be the representative.

JORGENSEN, EARLE M., CO., Los Angeles—Many photographs showing tool equipment, dies, etc., manufactured from materials supplied by this company will make up this display. Of special interest will be the photographs of tools used in the oil well industry, particularly those used in drilling operation. Representatives will include E. M. Jorgensen, H. J. Barton, J. V. Coulter and R. K. Beall.

KAY-BRUNNER STEEL CASTING CO., Los Angeles—Castings, car wheels, ornamental iron and fixtures will constitute this exhibit. Represented by L. D. Kay and J. F. Brunner.

KEESE ENGINEERING CO., Hollywood, Calif.—See Cooper Hewitt Electric Co. Representatives will be U. L. Beh and P. D. Gaines.

KELLY REAMER CO., Cleveland—A complete line of adjustable boring and reaming tools will be shown by this manufacturer. Included will be single-point tools, double-point boring bars, multiple cutting tools, block-type tools, and adjustable multiple-bladed roughing and finishing tools. E. W. Putnam will be in charge.

KNAPP, JAMES H., CO., Los Angeles—An automatic gas-fired high-speed steel treating furnace complete with blower and proportional gas mixer and automatic valve will feature this company's display. James H. Knapp, J. M. Lee and W. D. Cleghorn will be the representatives.

KRUPP NIROSTA CO. INC., Watervliet, N. Y.—A complete line of tungsten-carbide cutting alloys and tools will be displayed in this booth. J. H. Spade will be the representative.

L. A. AUTOMOTIVE WORKS, Los Angeles—Making up the equipment shown by this company will be a display of three small silent chain drives in operation; gears of the spur, bevel, internal and worm types; gear reduction units; and materials from which gears are made. Representatives will include E. B. Moore, C. E. Brelsford, R. L. Ford, R. H. Parmenter, Guido Wyss and H. H. Canterbury.

LAIDLAW, WILLIAM, INC., Delmont, N. Y.—Two models of metal cutting band saws will be shown in this company's booth. Representatives will be Herberts Machinery & Supply Co.

LANDIS MACHINE CO., Waynesboro, Pa.—A 4-inch pipe-threading and cutting machine will be operated in this exhibitor's space. Other equipment will include collapsible taps and automatic die heads. Represented by Herberts Machinery & Supply Co.

LASALLE TOOL CO., LaSalle, Ill.—This company will show surface grinders in operation. Represented by Herberts Machinery & Supply Co.

LEEDS & NORTHRUP CO., Philadelphia—An electric furnace for hardening steel with exactness; an electric furnace for tempering of steel uniformly in production quantities; and a complete line of potentiometer pyrometers of the indicating, recording and automatic control types will make up this exhibit. H. R. Abey, Jordon Korp and L. E. Emerich will attend.

LEITZ, E., INC., New York—Included in this display will be grinding and polishing machines featuring one with a new magnetic specimen holder; a micrometallograph for visual observation and photomicrography of metallurgical specimens; metallurgical microscopes ranging

Plant Visits To Show Western Industry

A NUMBER of interesting plant visitations are being arranged for visitors to the Western Metal congress and Western States Metal and Machinery exposition. According to W. W. Farrar, chairman of the plant inspection committee, a choice of excursions will be offered for Tuesday, Wednesday, Thursday and Friday mornings, Jan. 15, 16, 17 and 18. The schedule calls for visits to the following plants:

Oil field visitation to Signal Hill, starting at the Shell Oil Co. shop, Long Beach, Calif. Ralph Hall will be in charge.

Hughes Tool Co., 2445 Enterprise street, Los Angeles. Wade Hampton will be in charge.

Columbia Steel Co., Torrance, Calif.

Doheny Stone Drill Co., Lomita, Calif. William Grau in charge.

Union Tool Co., Torrance, Calif. J. O. Bishop will be in charge.

H. C. Smith Mfg. Co., Los Nietos, Calif. R. Crum in charge.

Stoody Co., Whittier, Calif. Joe Cook will be in charge.

Emsco Forging Co. and Western Drop Forging Co., Los Angeles. William DeRitter in charge.

Baash-Ross Tool Co., Los Angeles. Mr. Black will be in charge.

Axelson Machine Co., Los Angeles. William Laury will be in charge.

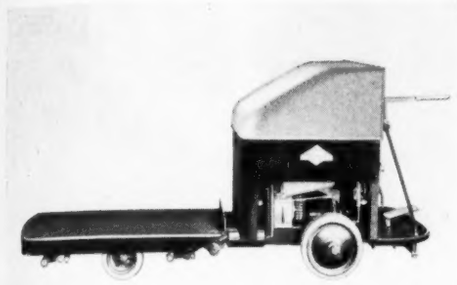
Emsco Derrick & Equipment Co., Los Angeles. William Fisher will be in charge.

Southern California Edison Co. steam plant, Long Beach, Calif. William Boxall in charge.

Southwestern museum in Los Angeles.

H. V. RUTH

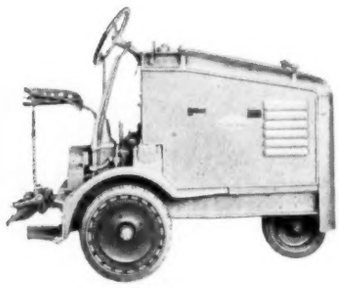
Secretary of the Los Angeles chapter of the American Society for Steel Treating and general secretary of the Western Metal congress and exposition committee



Heavy Duty Lift Truck

This 3-ton gasoline powered lift truck has a platform 28½ by 54 ins., and only 11 ins. high when lowered. Lifts 6,000 lbs. in 8 seconds. Maximum height 16 ins.

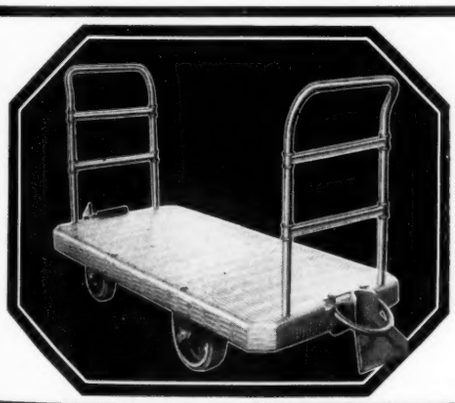
Clark Truclift



Light Duty Tractor Model

A compact power unit for the towing and pushing of trailers. It will turn around in a box car. Gasoline powered for 24 hours continuous service.

"Clarkat" Tructractor



Steel Platform Type

Substantial steel trailer, 2-ton capacity, rubber tires on metal wheels. Platforms 3 ft. by 6 ft., or 3½ ft. by 8½ ft. Tractors and trailers equipped with Clark Universal Coupler.

Clark Steel Trailer

SEE 'EM at the WESTERN METAL CONGRESS

Wherever handling and heavy hauling are problems whose solution can yield great savings,—and that means in foundries, machine shops, and all plants where metals are handled in bulk or in volume—Clark Tructractors will pay their own cost, and upkeep, plus a profit.

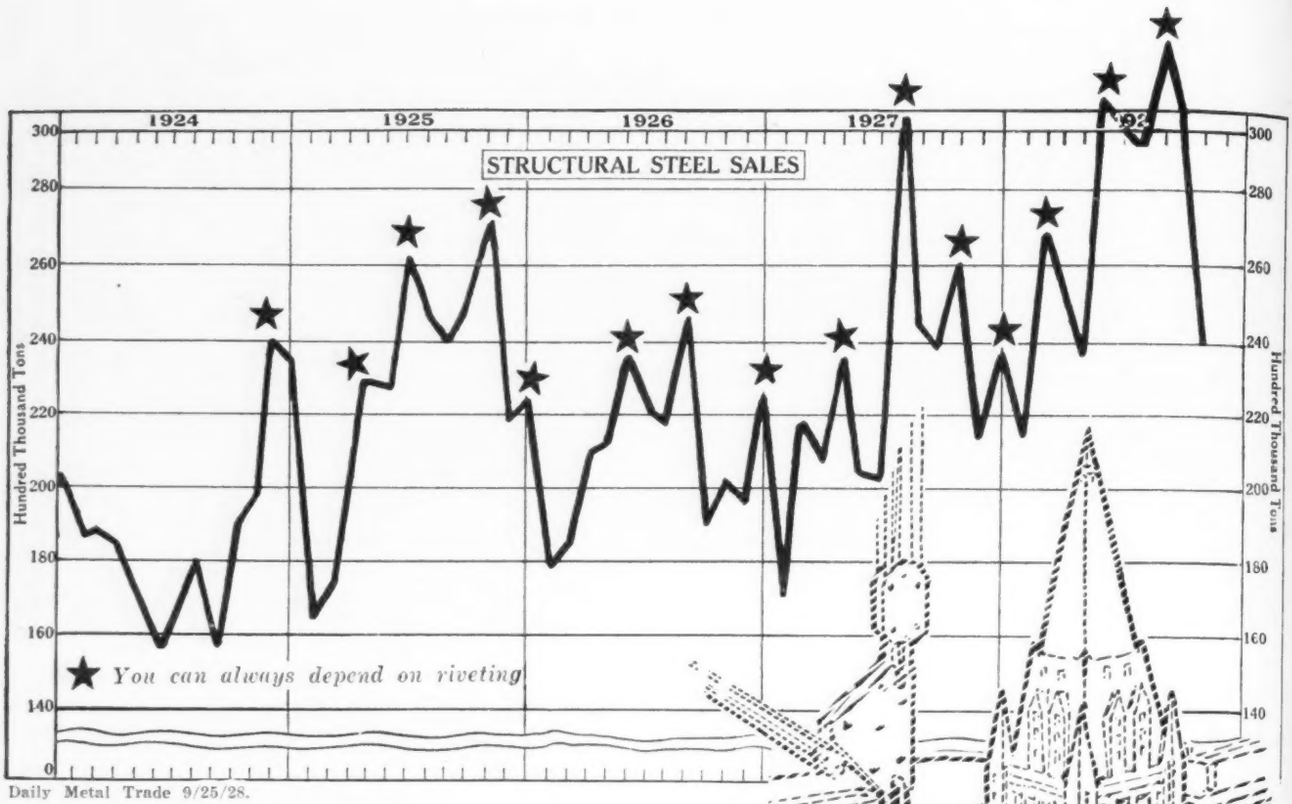
Whatever the condition, there is a model to meet it. In your plant further refinement of mechanical handling can relieve your men, speed your work, and reduce hauling expense. It is suggested you write for the fact stories of other companies which already own fleets of

CLARK TRUCTRACTORS

Or, if you are going to the Western Show, see 'em at the

Shrine Auditorium
Los Angeles
January 14-18
Booth No. 201

Clark Tructractor Co.
Battle Creek, Mich.



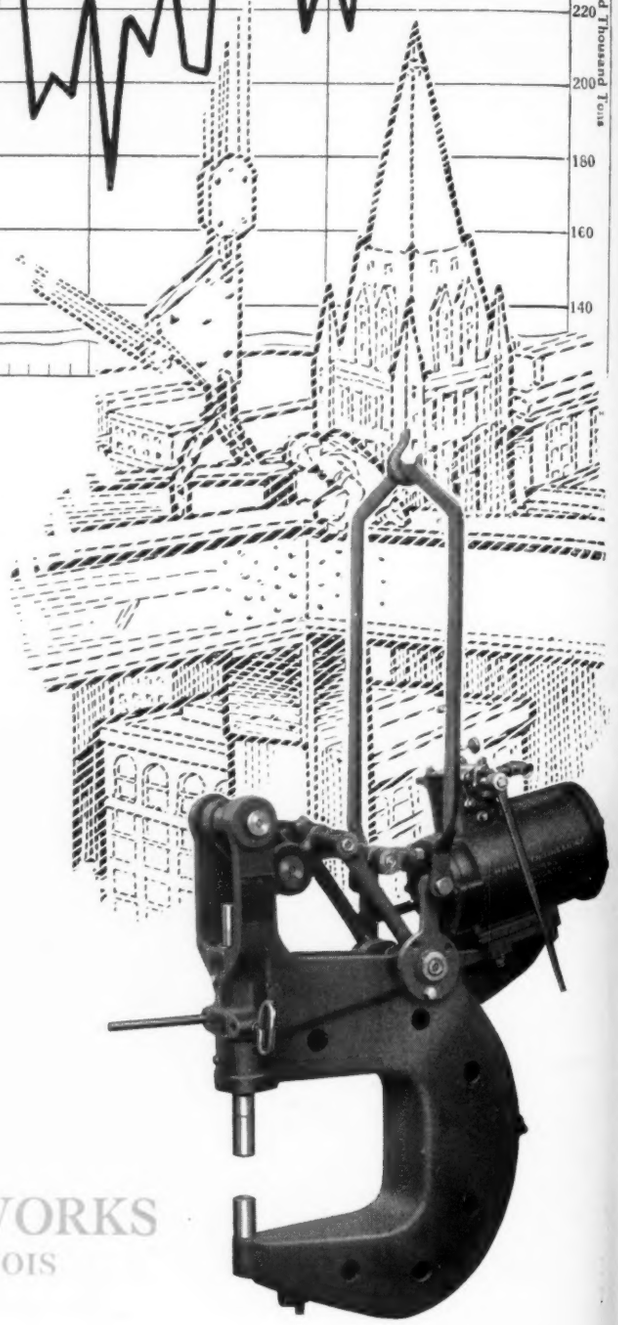
Daily Metal Trade 9/25/28.

Riveted Steel Breaking All Records!

Civic pride thrills with the riveters' crescendo. It tells of more schools, churches, libraries, skyscrapers and industries. The world is indebted to the genius who conceived the most dependable unit of steel fabrication—the rivet.

HANNA RIVETERS

are driving millions of rivets home to stay. The installation of a Hanna Riveter best suited for your work insures tight rivets at two-thirds of the cost by any other method.



HANNA ENGINEERING WORKS

1766 ELSTON AVE., CHICAGO, ILLINOIS

REPRESENTED IN

Southern California and Arizona by
HERBERTS MACHINERY & SUPPLY COMPANY
401 East Third Street, Los Angeles

Northern California and Nevada by
HERBERTS-MOORE MACHINERY COMPANY
140 First Street, San Francisco

from the simple bench type to an elaborate research model; and photomicrographic camera attachments. Represented by Spindler & Sauppe.

LINCOLN ELECTRIC CO., Cleveland—Complete electric arc welding equipment; a display of various welded steel products; and all-welded motor built by the company will occupy this booth. Represented by E. H. Peir Co.

LINDE AIR PRODUCTS CO., New York—This exhibit will be comprised of a complete line of equipment for oxyacetylene welding and cutting; acetylene floodlights; acetylene and oxygen in tanks and carbide; and a representative display of products fabricated by gas welding. In attendance will be: F. J. Forrest, C. S. Smith, C. E. Rhein, H. L. Frey, H. B. Rice, J. B. Ford, A. H. Matson and R. W. Boggs.

LUDLUM STEEL CO., Watervliet, N. Y.—This company will display a line of tool steels; a special steel for case hardening by the nitriding process; chrome-nickel steels resistant to acids, air, water and dilute solutions and which may be deep drawn, spun, easily machined, welded and polished to a mirror surface. H. G. Batcheller, J. E. Polhemus, H. A. De Fries, J. A. Spade and G. E. Batten will attend.

MACHINIST TOOL & SUPPLY CO., Los Angeles—Flexible shaft equipment with motors and stands; also accessories including rotary files, buffing wheels, grinding wheels, rasps, etc., will make up this display. The representatives will be N. L. DeLong, C. G. Almquist and C. L. Almquist.

MASTERSON, JOSEPH A., & CO., Los Angeles—Ball and roller bearings of the radial, angular and thrust types will be shown by this company. See Norma-Hoffmann Bearings Corp. Representatives will include J. A. Masterson H. R. Swanton, L. J. Masterson and Norman Bell.

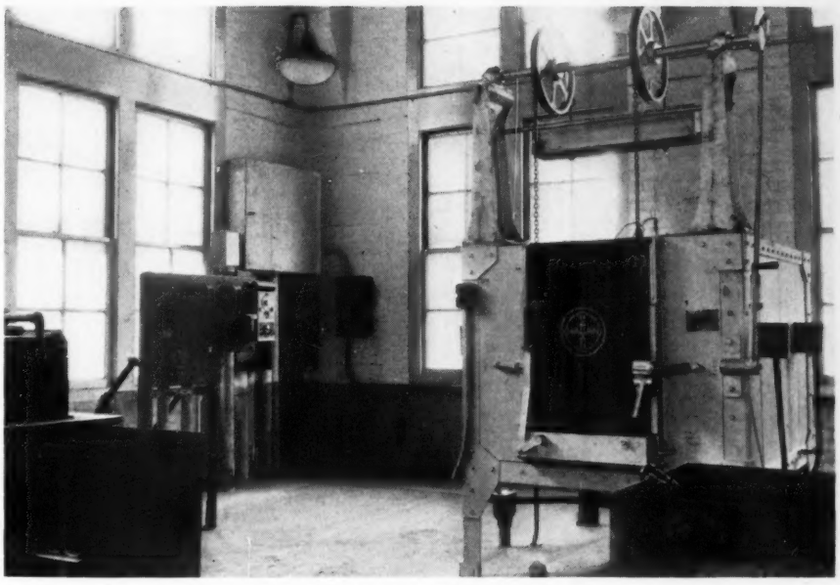
McGILL METAL CO., Valparaiso, Ind.—Shown in operation in this booth will be various types and sizes of ball bearings and a machine for testing ball bearings under service conditions. Represented by Joseph A. Masterson & Co.

MERCO NORDSTROM VALVE CO., San Francisco—The product of this company will be a lubricated plug valve made in cast iron, semisteel, bronze, aluminum; also some accessories pertaining to the operation of the valves. These cocks are used in the chemical, petroleum, gas and allied industries. C. C. Evernham and H. Boezinger will be in charge.

MERIT OIL EQUIPMENT CO., Cleveland—High-speed ball bearing drilling machines made by this company will be operated in this space. Represented by Herberts Machinery & Supply Co.

METTLER, L. B., CO., Los Angeles—Oil and gas burners for industrial applications will be exhibited in this booth. L. B. Mettler and C. O. Nordesson will be the representatives.

MINERALS & METALS CORP., Los Angeles—Products to be displayed by this company will include tungsten ore tungstic acid, tungsten metal powder, ferrotungsten; vanadium ore, vanadic acid, ferrovandaium; molybdenum ore, calcium molybdate, ferromolybdenum, molybdic



Box-type electric furnace used in laboratory of Stanford university. George J. Hagan Co., the manufacturer, will display it at the exposition

manganese; chrome ore, chromium metal, ferromanganese; chrome ore, chromiu mmetal, ferrochromium; tantalum ore, ferrotantalum; silica; fluorspar; feldspar; and other ores and metals. F. H. Fisher and F. L. Dean will attend.

MORSE TWIST DRILL & TOOL CO., New Bedford, Mass.—A complete assortment of small tools, displayed to illustrate processes used in the manufacture of forged drills as well as proper and improper pointing of drills, will make up this exhibit. W. H. Dick will be in charge.

MYERS MACHINERY CO., Los Angeles—A full line of punch presses and shearing machines will be shown in operation in this space under the direction of Arthur Myers.

NATIONAL TWIST DRILL & TOOL CO., Detroit—Twist drills, milling cutters, reamers, holes and a new-type heavy-duty counterbore will constitute this exhibit. Features will be display boards showing successive manufacturing steps in making twist drills and parabolic side milling cutters. Some of the smallest drills made are to be exhibited. Represented by J. H. Collins and Machinist Tool & Supply Co.

NEW DEPARTURE MFG. CO., Bristol, Conn.—Included in this company's display will be ball bearings of radial and thrust types; also ball bearing applications to electric motors, a large heavy-duty grinding spindle, a light high-speed internal grinder spindle; and a vertical spindle for a woodworking machine. Representatives will be E. A. Allen, R. K. McLeod and N. B. Nelson.

NIAGARA MACHINE & TOOL WORKS, Buffalo—This company's line of punch presses and shears will be shown in operation. Represented by Herberts Machinery & Supply Co.

NORMA-HOFFMANN BEARINGS CORP., Stamford, Conn.—Many types of ball, roller and thrust bearings are to be exhibited by this manufacturer. The representatives will be Norman Bell and Joseph A. Masterson & Co.

NORTHWESTERN MFG. CO., Milwaukee—A portable motor-driven arc welding equipment will be demonstrated in this company's booth. Represented by W. J. Aitken and Stoody Co.

NUTALL, R. D., CO., Pittsburgh—A new line of reduction gear units and speed reducers, featuring single-helical gears, roller bearings, three-section case and splash lubrication, will be demonstrated by this manufacturer. Flexible couplings and heat treated and hardened gears also will be included.

OAKITE PRODUCTS INC., New York—Comprising this exhibit will be a complete line of metal cleaning products. P. Boeck will be in charge.

P. L. & N. CO., Los Angeles—A super hard facing product is to be shown by this company. Represented by C. P. Morgan.

PACIFIC ABRASIVE SUPPLY CO., Los Angeles—See Carborundum Co. and Globar Corp. listings. Represented by W. T. Morin, T. W. Bayley, S. R. Dows, T. R. Chase, C. E. Bowman and W. E. Homeyer.

PANGBORN CORP., Hagerstown, Md.—Stationary and portable sandblast machines; blasting hose; sand blast operators' helmets; gloves; nozzles; steel abrasives; other accessories; and photographs of equipment installations made by that company will make up this display. Represented by Snyder Foundry Supply Co.

PEERLESS MACHINE CO., Racine, Wis.—A 9 x 9-inch universal-type high-speed metal sawing cutting tool steels and a 2-inch capacity power pipe-threading machine are to be demonstrated in this company's space. Represented by Herberts Machinery & Supply Co.

PEIR, A. H., CO., Los Angeles—See Lincoln Electric Co. Representatives will be A. H. Peir and C. J. Nyquist.

PELS, HENRY, & CO., New York—Triple combination punches and shears are to be shown by this company. Represented by Herberts Machinery & Supply Co.

PENTON PUBLISHING CO., Cleveland—Will show technical and industrial books and periodicals dealing with heat treating, forging and other phases of the metalworking industry. Restroom for those desiring to confer in quiet. Copies of IRON TRADE REVIEW, *Daily Metal Trade, The Foundry, Abrasive Industry, Marine Review*, and other Penton publications will be available. Represented by J. D. Pease, E. F. Ross, Don Partridge and R. C. Hill.

PERFECT CASTER MFG. CO., Long Beach, Calif.—This company will demonstrate two industrial trucks equipped with ordinary and special casters to compare tractive efforts required. Among representatives attending will

R. E. VOORHES

Secretary of the Los Angeles section of the American Society of Mechanical Engineers and member of the congress program committee

R. R. BOYD

Chairman of Los Angeles section, American Institute of Mining and Metallurgical Engineers and member congress program committee

be W. R. Darnell, R. W. Longfield, A. G. McGrath, C. T. Williams and J. H. Sutherland.

PLOMB TOOL CO., Los Angeles—The display of this company will comprise a complete line of automotive and aeronautic tools under the direction of M. B. Pendelton, Yaney Clark, E. D. Moore, J. L. Larsen, J. B. Delamer, W. W. Foster, L. M. Graham and L. G. Duncan.

PUROX CO., Denver—Oxyacetylene welding equipment made by this company is to be exhibited in co-operation with Stoody Co.

REGAN FORGE & ENGINEERING CO., San Pedro, Calif.—Oil well equipment is to be shown by this manufacturer. Among representatives will be: J. M. Regan, B. A. Cleveland, B. S. Minor, F. J. Swarm, J. P. Beer and R. Watson.

RHODES MFG. CO., Hartford, Conn.—A 3½-inch vertical slotter will operate in this manufacturer's booth. Represented by Herberts Machinery & Supply Co.

ROCKFORD MACHINE TOOL CO., Rockford, vertical slotter will be in operation in this be a 14-inch x 6-foot geared-head toolroom lathe and a 20-inch back-geared drill press. Represented by Herberts Machinery & Supply Co.

ROTOR AIR TOOL CO., Cleveland—This manufacturer will demonstrate portable pneumatic grinders and drills and air sander for use with sanding disks and for use with cup wheels for flat finish surfacing. Represented by Smith-Booth-Usher Co.

SAVAGE, W. J., CO. INC., Knoxville, Tenn.—A metal cutting machine will be demonstrated by this manufacturer through Smith-Booth-Usher Co.

SIDNEY MACHINE TOOL CO., Sidney, O.—In this company's booth will be demonstrated a geared-head engine lathe for precision work. Represented by Smith-Booth-Usher Co.

SIMONDS SAW & STEEL CO., Fitchburg, Mass.—Making up this display will be circular metal-cutting saws, both solid and inserted tooth types files and hack saw blades. Representatives will be G. I. Fisher, C. A. Deboi, G. E. Riley and W. A. Rohde.

SLEEPER & HARTLEY INC., Worcester, Mass.—A universal spring coiling machine which turns out springs at a high rate. L. G. Henes and Henry Nigro will be in attendance.

SMITH-BOOTH-USHER CO., Los Angeles—See listings of Buffalo Forge Co.; Hardinge Bros. Inc.; Sidney Machine Tool Co.; Wilson Welder & Metals Co.; Hisey-Wolf Machine Co.; E. C. Atkins & Co.; E. W. Bliss Co.; Andrew C. Campbell Inc.; Rotor Air Tool Co.; and Bignall & Keeler Machine Works. B. W. Dimend will be in charge.

SNYDER FOUNDRY SUPPLY CO., Los Angeles—See Pangborn Corp. Representatives will be G. F. Snyder, G. W. Effinger, W. G. McLean, Steven Mocsny and A. M. Barker.

SONNTAG CO., Los Angeles—Combination punch and shearing machines and billet shears will constitute this exhibit. A feature of the equipment is the steel plate frame construction. Arthur E. Myers will be in charge.

SOUTHERN CALIFORNIA EDISON CO., Los Angeles—Electrically heat treated products from industrial plants served by this company; and photographs of numerous electric furnace operations installations will make up this company's display. In attendance will be

DR. KOTARO HONDA

Professor of metallography, Tohoku Imperial university, Sendai, Japan, as official representative of the Japanese government, will present a paper before the Western Metal congress

G. N. Hawley, W. L. Boxall, S. L. Cipperly, and M. R. Armstrong.

SOUTHERN CALIFORNIA GAS CO., Los Angeles—Shown in operation in this company's booth will be a complete line of heat treating furnaces of the box and pot types; also a general line of industrial heat treating appliances. C. M. Grow and E. M. DeReamar will be in charge.

SPENCER TURBINE CO., Hartford, Conn.—Turbo compressors for supplying air to oil and gas burning industrial furnaces, brass melting pots, foundry cupolas, etc., will make up the equipment shown by this company. One unit of 650 cubic feet per minute will supply the air for furnaces operating in the exposition. Representatives will be H. M. Grossman and James Warren.

SPINDLER & SAUPPE, San Francisco—See listing of E. Leitz Inc. G. Spindler will be in charge.

STANDARD OIL CO. OF CALIFORNIA, Los Angeles—The display of this company will consist of a complete line of petroleum products.

STANDARD TOOL CO., Cleveland—Making up this exhibit will be the company's line of twist drills, reamers, taps, milling cutters, drill chucks and special tools. J. G. Green will be the representative.

STERLING ELECTRIC MOTORS INC., Los Angeles—Shown in operation in this exhibit will be a full line of horizontal protected motors from ¼ to 30 horsepower; a special motor for machine tool applications; a new line of grinder motors from ¼ to 2 horsepower; and grinders and buffers. Among representatives attending will be C. E. Johnson, Earl Mendenhall, A. A. Adams, H. S. Willing, J. R. Howell and Ransom Gearing.

STRAND, N. A., & CO., Chicago—This manufacturer will show flexible shaft motor-driven polishing, grinding and sanding machines; rotary filers; screw drivers; nut setters; and automobile body and fender refinishing machines. The capacities of these tools will range from ¼ to 2 horsepower. M. N. Thackaberry will be the representative.

STOODY CO., Whittier, Calif.—Welding machines; welding accessories, including rods, goggles, lenses, carbons and borium; rotary drilling bits; flexible shaft grinders; and castings will be assembled for the display of this manufacturer. The representatives will be R. L. Ozias and J. C. Blake.

SUTOR & CO., Los Angeles—See listing of American Car & Foundry Co.

TIMKEN STEEL TUBE CO., Canton, O.—Featuring this company's exhibit will be a 16-foot conveyor resembling a run-out table on which miniature ingots will travel. The company's representatives will be A. J. Sanford and J. E. Fick.

UNION DRAWN STEEL CO., Los Angeles—A full line of cold-drawn steel products will constitute this manufacturers' exhibit. E. E. Tibbot will be in charge.

U. S. ELECTRICAL MFG. CO., Los Angeles—Electric motors of various sizes and for various applications will constitute this display.

VANADIUM CORP. OF AMERICA, New York—Constituting this manufacturer's exhibit will be ferrovanadium, ferrosilicon, ferrochromium and other ferroalloys; forgings, castings and tools of vanadium steel; ore specimens, oxide and chemicals. Attending will be W. A. Miller, G. L. Norris and Jerome Strauss.

VERNON FOUNDRIES, Los Angeles—Punch presses and shears will be exhibited in the space of this company. The representative will be A. E. Myers.

VICTOR OXYACETYLENE EQUIPMENT CO., San Francisco—A complete line of welding and cutting equipment and accessories will be on display. Represented by E. L. Mathy.

WEST COAST PIPE & STEEL CO., Los Angeles—Welding of steel pipe will be demonstrated in this company's booth.

WESTERN DROP FORGE CO., Los Angeles—Making up this exhibit will be dies, forgings and a number of photographs illustrating the products of this manufacturer. G. E. Moreland and W. A. DeRidder will be the representatives.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa.—Equipment to be shown in this booth will consist of a 400-ampere single-operator automatic electric arc welding machine in operation welding 12-inch pipe; and an 8-inch kilowatt electric steel treating furnace also in operation. Representatives will include H. D. Easterbrook, J. H. Fenton, Dan Zinck, A. S. Lyon, E. W. Nilsson, C. H. Kaufman and J. P. Jones.

WHITMAN BARNES-DETROIT CORP., Detroit—A complete line of high-speed drills, reamers, milling cutters, etc., will be shown by this manufacturer under the direction of H. Z. Callender and D. H. Klieves.

WILCOX, E. A., CO., San Francisco—See listings of George J. Hagan Co.; Young Bros. Co.; Dings Magnetic Separator Co.; Ajax Electrothermic Corp., Calorac Electric Corp.; and Electrical Refractories Co. E. A. Wilcox will be in charge.

WILSON-MAEULEN CO., New York—Recording pyrometers, indicating pyrometers, automatic temperature controllers, resistance bulb electric thermometers and Rockwell-type hardness testers will constitute the equipment in his company's space. Represented by S. C. Horn, W. P. Balderston and D. H. Grubb.

WILSON WELDER & METALS CO., Hoboken, N. J.—Included in the equipment to be shown by this manufacturer will be a 200-ampere one-arc motor-generator welding machine; a 200-ampere one-arc gasoline engine driven type welding machine; also welding wire and accessories. Represented by Smith-Booth-Usher Co.

WISCONSIN ELECTRIC CO., Racine, Wis.—Portable electric drilling machinery and tools will constitute this company's display.

YOUNG BROS. CO., Detroit—Making up this company's exhibit will be electric laboratory ovens; working models of continuous conveyor ovens; and photographs and descriptive literature of ovens made by this company. Represented by E. A. Wilcox Co.

Three split ingots showing the uniformity of acid open-hearth steel will feature the display of Heppenstall Forge & Knife Co.

At the Western Metal Congress and Western States Metal & Machinery Exposition Los Angeles, January 14-18, 1929

Airco Products For Oxyacetylene Welding & Cutting

OXYGEN
ACETYLENE
CARBIDE

Welding Torches
Cutting Torches
Oxygen Regulators
Acetylene Regulators
Acetylene Generators
Oxygen Manifolds
Hand Trucks
Cutting Machines
Welding Machines
Welding Rods
Fluxes
Hose
etc.

46 Oxygen Plants **22 Acetylene Plants**
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22 District Offices 110 Distributing Stations

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Air Reduction Sales Company

Manufacturers of

Airco Oxygen and Acetylene, Airco-National Carbide, Airco-Davis-Bournonville Oxyacetylene Apparatus

Exhibiting in Spaces 328-330

Aisle 5 — Ground Floor

REPRESENTATIVES of metal working industries and all users of oxyacetylene welding and cutting methods are invited to visit the Airco Exhibits and consult with Airco representatives.

Supplementing the exhibit of gases and hand welding and cutting equipment, particular attention will be directed to mechanical welding and cutting methods, showing

The No. 4 Oxygraph, a shape cutting machine for cutting straight lines and irregular shapes with the oxyacetylene torch, with motor-driven tracing device for following drawing, pattern or templet, and large cutting area.

The No. 4 Camograph, a shape cutting machine for repetitive production work, cutting shapes with the oxyacetylene torch, guided by cam conforming to the shape to be cut, with magnet control and motor drive—a semi-portable machine.

The No. 2 Radiagraph, a portable, motor driven cutting machine, for cutting straight line and circles with the oxyacetylene torch.

Air Reduction Sales Company

Los Angeles	Emeryville, Cal.	Seattle
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Technical Papers and Authors for Western Metal Congress

Morning sessions will be held at 10:00 a. m. in Hotel Biltmore, afternoon sessions at 2:00 p. m. in Shrine Auditorium

Monday, Jan. 14

MORNING

Chairman: Prof. W. H. Clapp, department of metallurgy and machine design, California Institute of Technology, Pasadena, Calif.

"Importance of Shops in University Training," by Arthur B. Domonoske, executive head, mechanical engineering department, Stanford university, Stanford University, Calif.

"Gear Manufacturing Including Heat Treatment," by F. A. Brooks, chief engineer, Johnson Gear Co., Berkeley, Calif.

"Investigation of Fatigue Resistance of Eutectoid Carbon Steel When Drawn at Different Temperatures," by Mr. Watson, metallurgist, Regan Forge & Engineering Co., San Pedro, Calif.

"Heat Treatment of Dies, Tools and Gears," by Jordan Korp, Leeds & Northrup Co., Philadelphia.

AFTERNOON

Foundry division program sponsored by the Metal Trades and Manufacturers association. Chairman: Carroll A. Stilson, secretary of the association.

"Special Nickel Castings," by Paul D. Merica, assistant manager, International Nickel Co., New York.

"Sand Testing Equipment and Demonstration," by A. A. Grubb, Mansfield, O., and member of the sand testing committee of the American Foundrymen's association.

"Nickel-Chrome Alloy Iron," by W. R. Shimer, metallurgical engineer, Bethlehem Steel Corp., Bethlehem, Pa.

"Heat Treatment of Carbon and Alloy Steel Castings," by J. E. Donnellan, secretary, recommended practice committee of the American Society for Steel Treating, Cleveland.

"Furnaces," by R. E. Talley, president, George J. Hagan Co., Pittsburgh.

Tuesday, Jan. 15

MORNING

"Selecting Metals and Alloys for Severe Services Involving Corrosion, Erosion and Heat Resistance, with Particular Reference to Oil Refinery Conditions," by Jerome Strauss, chief research engineer, Vanadium Corp. of America, Bridgeville, Pa.

"Valves and Fittings in the Oil Refinery, the Materials Used in Their Construction, Their Design and Application in Particular Services, and High-Pressure Oil Conveying and High-Pressure Gas Distribution," by Vincent P. Malcolm, chief engineer, Chapman Valve Co., Indian Orchard, Mass.

"Tendency Toward Higher Steam Pressures in Both Marine and Stationary Services, the Materials Available for the Construction of Boilers for These Higher Pressures, and Some of the Factors Involved in Their Design," by Robert L. Daugherty, professor of mechanical engineering, California Institute of Technology, Pasadena, Calif.

"Heat, Refractories and Insulation," by Guy A. Barker, manager, industrial department, Johns-Manville Inc., San Francisco.

AFTERNOON

American Society of Mechanical Engineers will conduct a symposium of five papers on the manufacture of oil field specialties. Chairman: H. H. Anderson.

"Tool Joints," by E. W. Goesor, chief engineer, Emsco Derrick & Equipment Co., Los Angeles.

"Cast Steel Slush Pump Cylinders," by Lester Keim, general manager, Oil Well Supply Co. of California.

"Kellys, or Grief Stems," by E. W. Timbs, chief engineer, Union Tool Co. division of National Supply Co., Torrance, Calif.

"Sucker Rods," by W. H. Laury, chief metallurgist, Axelson Machine Co., Los Angeles.

"Heat Treated Drill Pipe," Standard Seamless Tube Co., Pittsburgh.

These five papers will be rather similar in the method in which the material is organized, touching chiefly upon the service to which they are subjected, the raw material used, together with its physical property, the forging and heat treating of same, and the gaging and control of production.

Wednesday, Jan. 16

MORNING

American Petroleum Institute, California Division of Development and Production Engineering. Chairman: A. C. Rubel, Union Oil Co. of California, Los Angeles.

"Sucker Rod Strains and Stresses," by F. W. Lake, superintendent of operations, Union Oil Co., Los Angeles.

"Drill Pipe Failures," by Ben Stroud, sales manager, National Tube Co., Pittsburgh.

"Casing Failures," by K. V. King, chief research engineer, Standard Oil Co. of California.

"Welding and High-Pressure Gas Distribution," by C. J. Coberly, president Kobe Inc.

AFTERNOON

American Institute of Mining and Metallurgical Engineers. Chairman: Glenn Robertson, Associated Oil Co., San Francisco.

"On the Double Diagram of the Iron-Carbon System," by Dr. Kotara Honda, professor of metallography, Tohoku Imperial university, Sendai, Japan.

"Proposed Metallurgical Control for Small Heat Treating Plants," by Dr. Welton J. Crook, professor of metallurgy, Stanford university, Stanford, Calif.

"Electroplating and the Uses of Copper in Machinery." Speaker unannounced.

"Heat Treatment of Gears," by W. H. Phillips, vice president, Molybdenum Corp. of America, Pittsburgh.

Thursday, Jan. 17

MORNING

Pacific Coast Gas Association. Chairman: C. M. Grow, Southern California Gas. Co., Los Angeles.

"Gas and Electricity as Heat Mediums," by F. W. Manker, vice president, Surface Combustion Co., Toledo, O.

"Heat Treating Furnace Design," by J. H. Gumz, industrial engineer, Pacific Gas & Electric Corp., San Francisco.

"Existing Heat Treating Installations," by E. M. DeReamer, industrial engineer, Southern California Gas Co., Los Angeles.

"Gas as Applied to Carburizing," by Robert G. Guthrie, metallurgist, Peoples Gas Light & Coke Co., Chicago.

AFTERNOON

Pacific Coast Electrical Association. Chairman: R. C. McFadden, Southern California Edison Co., Los Angeles

Address by Paul Downing, vice president, Pacific Gas & Electric Corp., and president, Pacific Coast Electrical assocaition.

"Electric Heat as Applied to Industry," by C. L. Ipsen, consulting and designing engineer, industrial heating and welding department, General Electric Co., Schenectady, N. Y.

"Design as Applied to Arc-Welded Construction," by Gilbert D. Fish, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Friday, Jan. 18

MORNING

Society of Automotive Engineers. Chairman: Ethelbert Favary, Moreland Motor Truck Co., Los Angeles

"Manufacture and Heat Treatment of Automobile Leaf Springs," by J. B. Rauen, general manager, U. S. Spring Co., Los Angeles.

"Production of Nickel Steel Castings by Electric Furnace Method," by E. Favary, consulting engineer, Moreland Motor Truck Co., Los Angeles.

"Aluminum as Applied to the Automotive and Airplane Industries," by Dr. Zay Jeffries, chief research engineer, Aluminum Co. of America, Cleveland.

"Some Phases of Aircraft Construction." Speaker unannounced.

"Metallurgical and Heat Treating Problems in Motor Car Manufacture," by J. M. Watson, chief metallurgist, Hupp Motor Car Co., Detroit.

AFTERNOON

American Welding Society, American Society of Civil Engineers, American Institute of Electrical Engineers and the American Institute of Architects will participate in this session. Chairman: A. E. DeBrun, Pacific Pipe & Supply Co., Los Angeles.

"The Welding of Steel Buildings and Bridges," by Dr. Frank P. McKibben, consulting engineer, General Electric Co., Schenectady, N. Y.

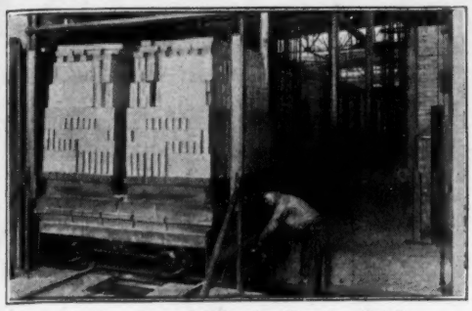
"Heat Treatment with Oxyacetylene Flame," by J. J. Bruton, service engineer, Oxweld Acetylene Co., New York.

"Building Machinery with Arc-Welded Steel," by David Hall, district engineer, Westinghouse Electric & Mfg. Co., Los Angeles.

IRON TRADE REVIEW

Volume 83, Number 26 — Published Every Thursday

E. L. SHANER, Editor. — *J. D. PEASE, Advertising Director.* — *F. F. LIGHT, Circulation Manager.*



Employs Tunnel Kilns for Burning Brick. Page 1617.

MASS production methods now being employed in the brickmaking industry are contributing to a more uniform product. The application of the regenerative-type tunnel kiln to the art of brickmaking, as explained in the article on page 1617, has effected a large decrease in the manufacturing time. Thermocouples inserted at different points in the furnace give a close control over the temperatures to which the brick is subjected in the burning process. The design of car tops also makes for uniformity.

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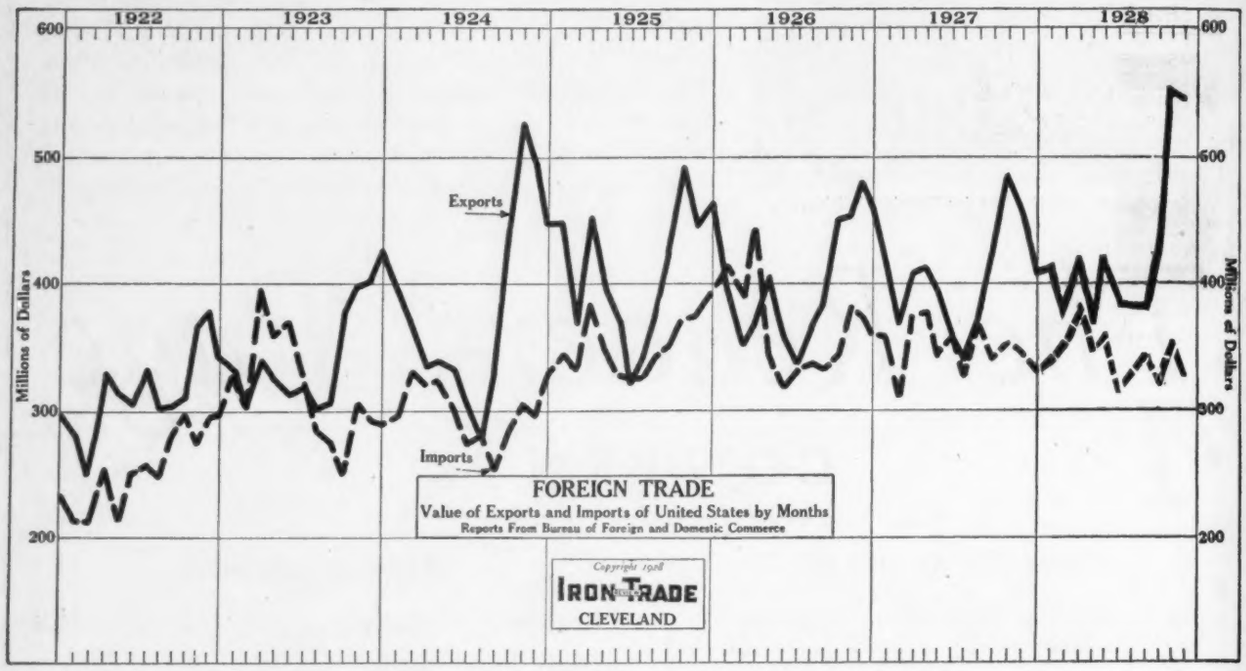
The Business Trend



European Recovery Favorable

By JOHN W. HILL, Financial Editor

ONE of the most significant developments of 1928 has been the rise of exports of American merchandise to the best levels of recent years. In October exports amounted to $550,000,000, the best figure since January, 1921. November was not quite up to this mark but the total of $546,000,000 compared with $461,000,000 in November, 1927.

FOR the first 11 months of the year exports were $4,655,000,000 compared with $4,457,000,000 in the like period of 1927. Imports were $3,752,451,000 compared with $3,853,509,000 in the corresponding period of last year. The export balance in 1928 to the end of November was $903,000,000. In that period of 1927 the export balance was $604,000,000.

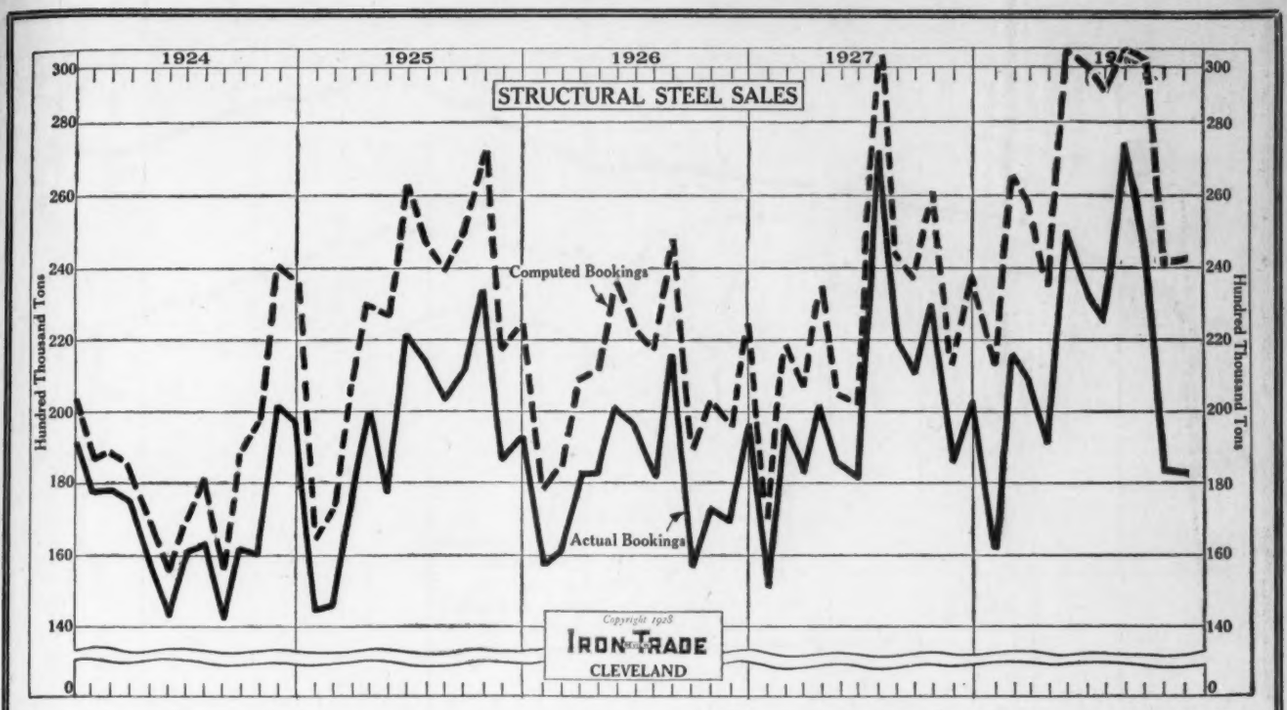
NOTWITHSTANDING the large balance of exports of merchandise the country lost much gold by export in 1928. This seems an extraordinary condition until it is remembered that Americans have continued to send huge sums abroad for investment in foreign securities. This is in keeping with the history of creditor nations. It was true of Great Britain and her far-flung security holdings before the war.

IT IS more than a coincidence that greater export trade totals are appearing concurrently with progress of stabilization in Europe. All of the leading nations abroad now either have returned their currencies to their old gold parity, or have revalued them at a new stabilized level. This is an important evidence of the great strides that have been made in healing the great economic wounds of the war.

THE one obstacle remaining in the path is final settlement on a definite figure of the German reparations. This will involve revision of the Dawes' plan. It appears that it may be possible to work out some sane and practical plan in 1929. Such a conclusion would amount to a constructive development of first magnitude.

ENOUGH progress has been made in Europe already to give strong indications that a forward and upward surge of world trade is near at hand. The rest of the world is lagging far behind the United States in the matter of living standards. The next decade most likely will witness a movement in the direction of lessening the discrepancy in this respect between this country and other peoples.

The Business Trend

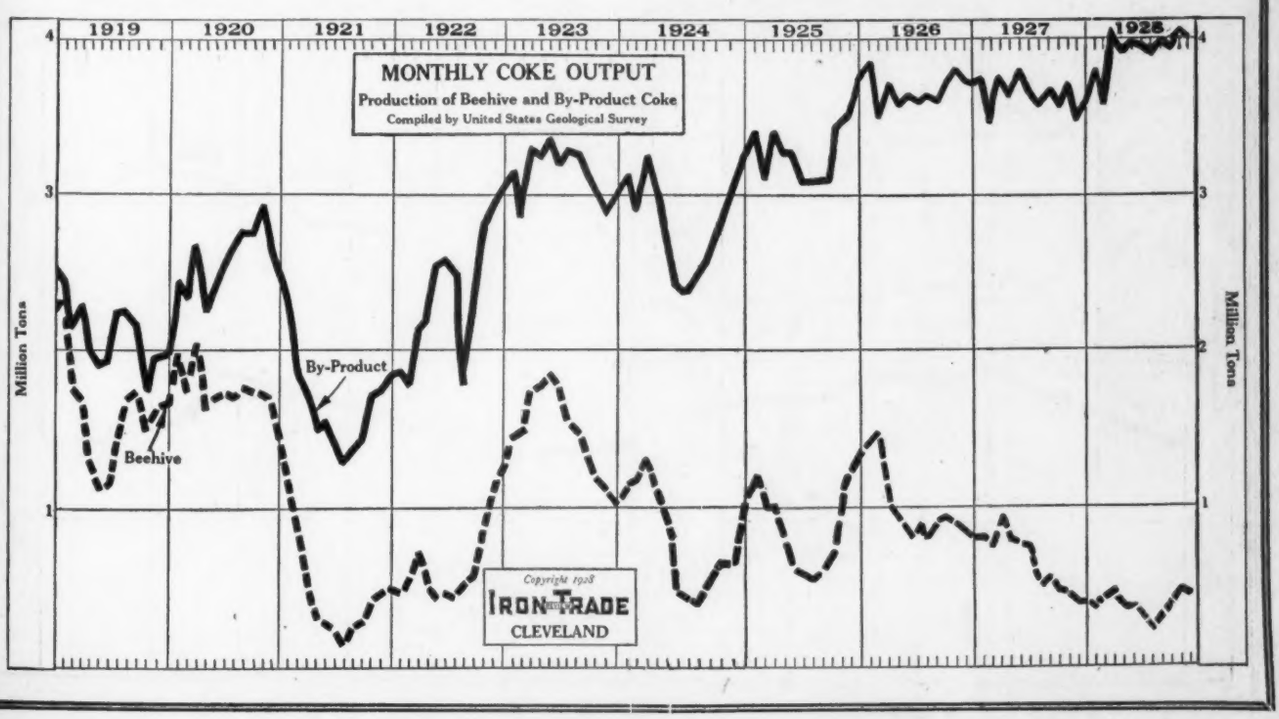


Structural Steel Sales

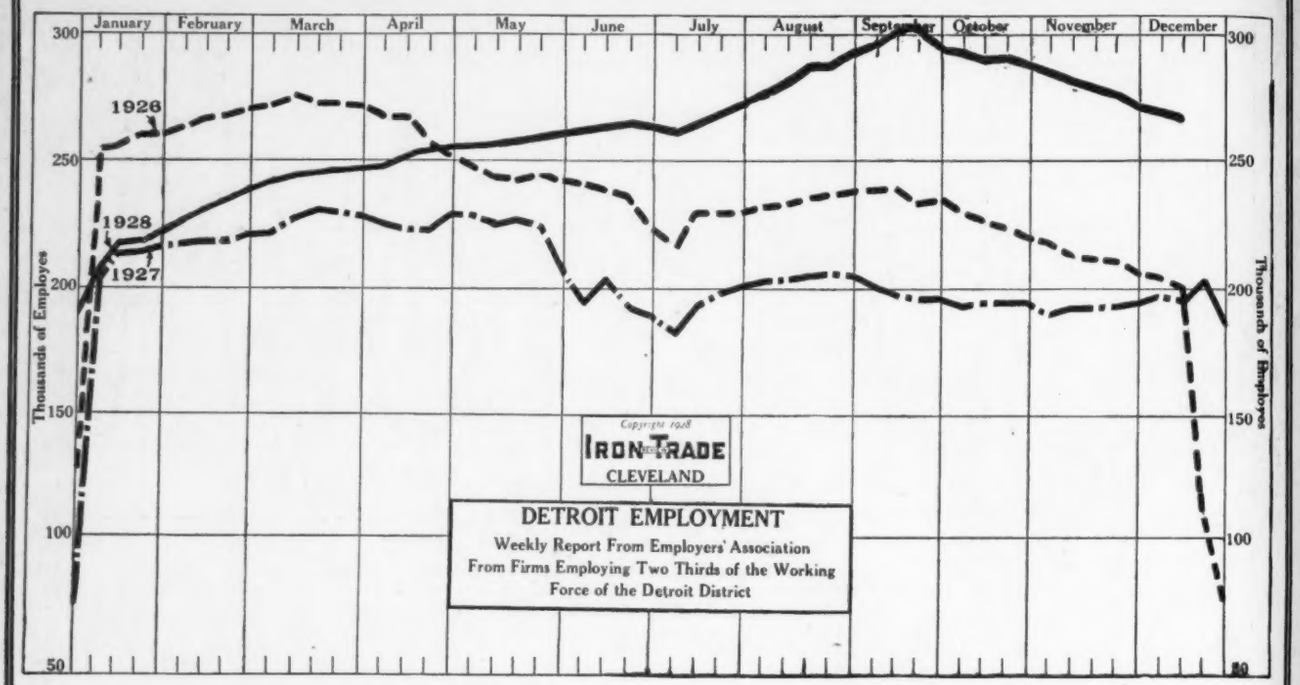
NEW orders of fabricated structural steel in November, as reported to the department of commerce by leading manufacturers, were 65 per cent of capacity. Tonnage actually reported was 187,331 tons compared with 192,854 tons in October and 193,859 tons in November, 1927. The computed total of structural steel orders for November was 243,750 tons compared with 240,000 in October and 236,250 tons November, 1927. Shipments during the month were 288,750 tons, with 247,500 tons one year before.

Coke Output

ALTHOUGH the total production of by-product coke in November declined slightly compared with the preceding month, the daily rate of output showed a small increase. Aggregate production was 4,122,150 tons or 137,000 tons per day compared with 4,219,262 tons, or 136,105 tons per day in October. The daily rate increased 1 per cent. Beehive coke production was 416,000 compared with 421,000 in October. Both beehive and by-product coke output showed a substantial gain over November 1927.



The Business Trend

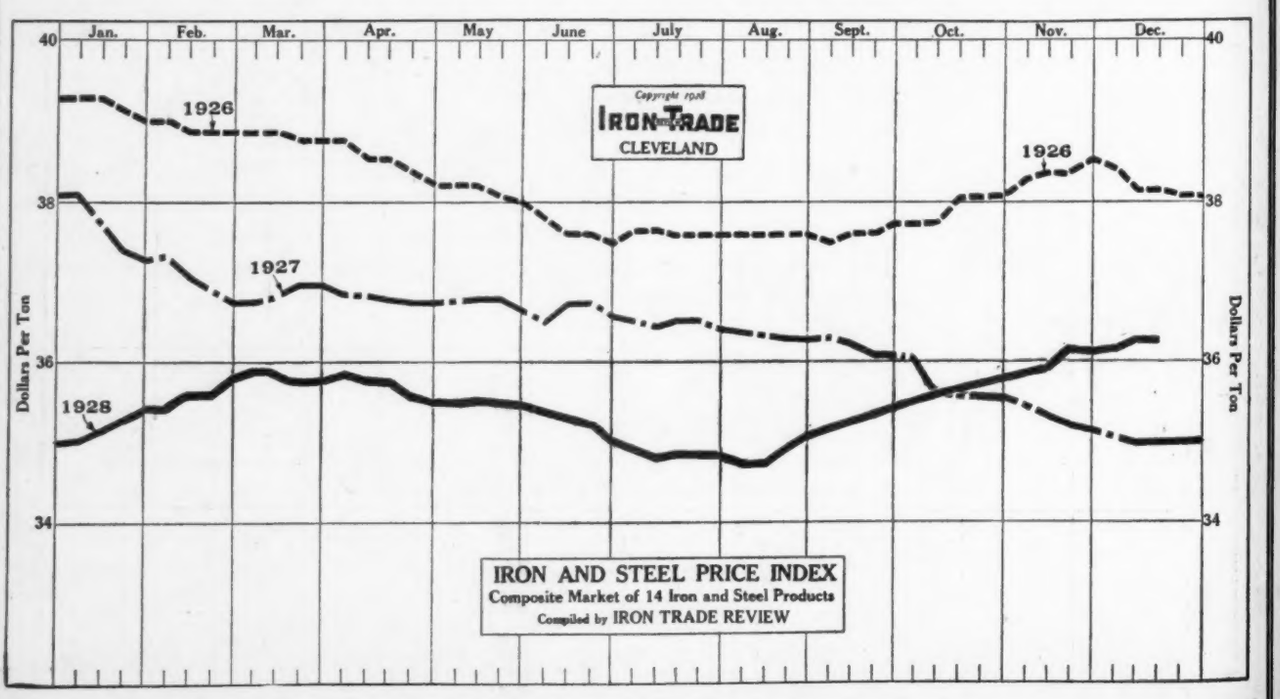


Detroit Employment

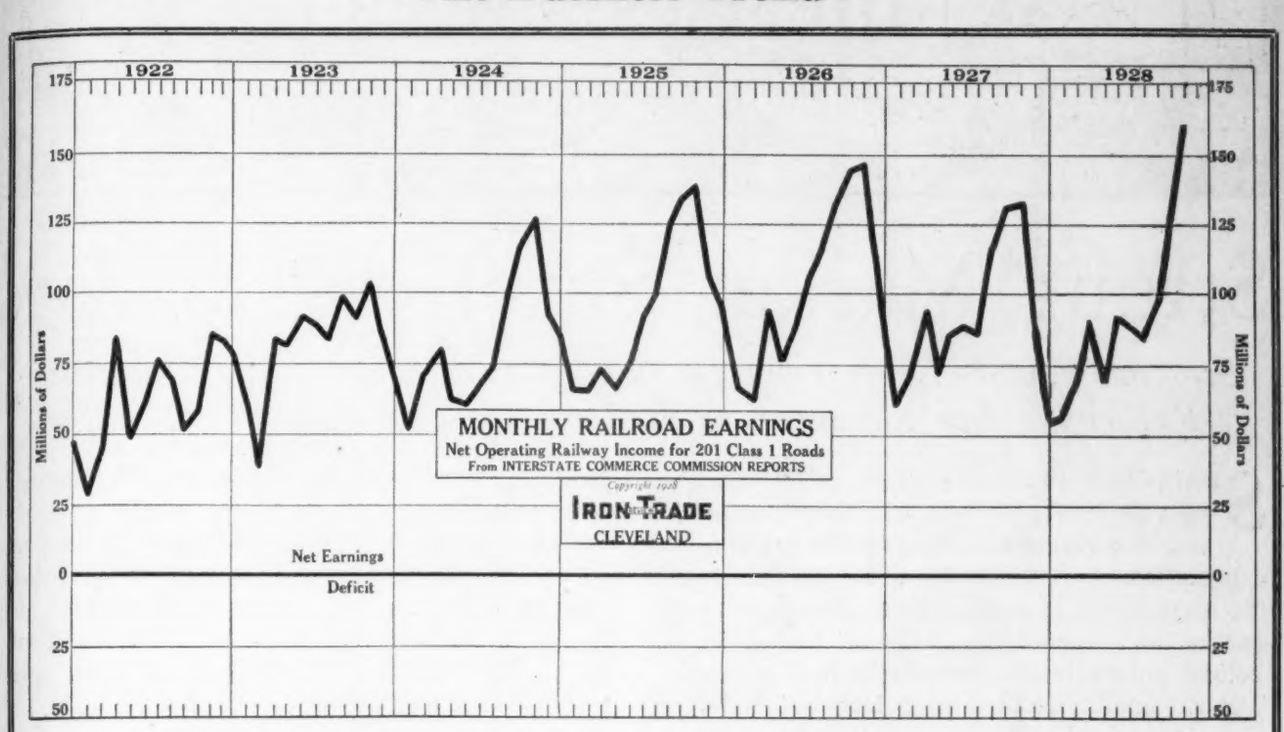
EMPLOYMENT in the Detroit district has been declining seasonally. It continues well above any previous peak for this season, however. In view of the extensive plans being made by most of the leading automobile companies for large production of cars in the new year, it is probable that employment will turn up in the Detroit manufacturing district shortly and possibly rise to a new high mark early in 1929. Large automobile companies are preparing new models for the January motor shows.

Steel Price Index

IRON and steel prices are closing the year with every indication of underlying firmness. However, there have been no recent marked advances and IRON TRADE REVIEW'S composite market average the week of Dec. 18 stood at $36.24 a ton unchanged from the preceding week and compared with $35.09 one year ago. One of the most interesting of recent developments has been the appearance of improvement for pig iron, following pronounced and extended weakness for that basic product.



The Business Trend

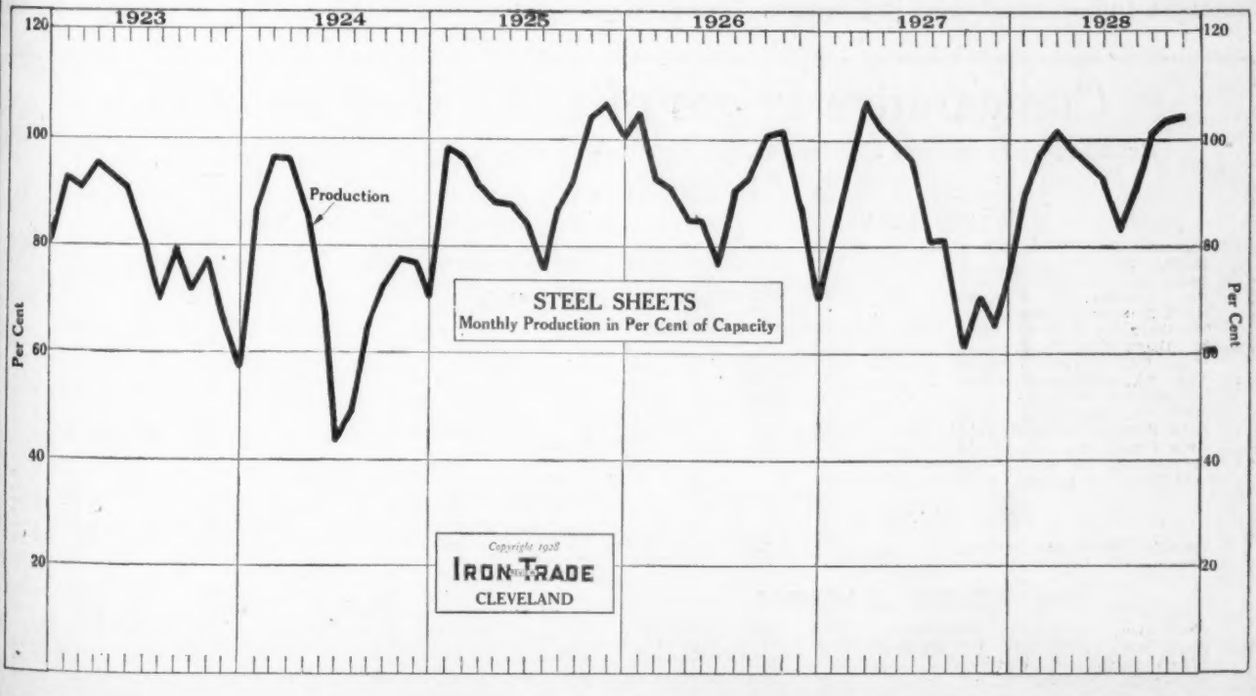


Railroad Earnings

DURING October net income of class I railroads rose to $166,000,000. This established a new high record for any month in the history of American transportation. It compared with $134,000,000 one month before and $133,000,000 one year ago. The rise in earnings for the railroads is in keeping with the improved course of railroad income during the last few years. In 1928 these earnings probably will make a new high record, due to expanded traffic in the later months of the year.

Sheet Situation

ONE of the most interesting and significant features of the present steel market is that production, sales and shipments of steel sheet continue well above usual seasonal levels. During November production declined slightly in total, although the rate of output represented 104.8 per cent of the industry's plant capacity compared with 103.5 per cent in October, according to the computation of the National Association of Flat Roll Steel Manufacturers. Shipments showed some seasonal decline during November.



Strong Market Survives Holidays

Seasonal Factors Depress but Do Not Obscure Sound Basic Situation—Expect Pig Iron Shipments to be Brisk—Pipe Demand Is a Feature

SEASONAL factors continue to retard business in iron and steel but they can neither mar the record of 1928 nor obscure the high expectations for 1929. As usual at this season the markets are in a state of suspension, with production and consumption alike disturbed by the holiday interruptions, inventories and repairs.

Basic, underlying conditions have not undergone any change and still are exceptionally sound for the season. The opinion is widespread that consumption will come back strongly in the week following New Year and that supplies of certain products, notably pig iron and steel sheets, will be inadequate if proposed consuming schedules are observed.

Pig Iron Shipments Are Heavy

In pig iron the holiday letup appears less pronounced than in finished steel. December shipments will fall only a trifle short of the average of October and November, which is tantamount to saying they are not far below the year's peak. Shipping instructions specify unusually heavy tonnages to be moved early in January. Southern producers are discussing a flat $17, Birmingham, price after Jan. 1, which would be a 50-cent rise for most of them. In eastern Pennsylvania not all of the recent advances appear to have been established. One transaction in No. 2 foundry iron in the Pittsburgh district has cast some doubt on the $18 market. Otherwise, pig iron prices are firm and unchanged.

Pipe Bookings Are Numerous

On pipe of all descriptions the market is unusually active. Two New York interests each have closed on 5000 tons of cast pipe. The leading maker of heavy steel will supply 35,000 to 40,000 tons of plates for the northern New Jersey riveted water line, provided the low bidder receives the award. Milwaukee opens bids Dec. 28 on 9000 tons of cast pipe. The Milwaukee maker of welded pipe, which in five major lettings has booked 174,500 tons, has been awarded a 23,000-ton southwestern pipe line. Effective Jan. 1 an adjustment in discounts gives lapwelded steel pipe an advantage of one point over seamless pipe.

Chicago district plate mills, in addition to close

Comparative Prices of Iron, Steel and Coke

Representative Market Figures for This Week, Last Month, Three Months and One Year Ago

	Dec. 26, 1928	Nov., 1928	Sept., 1928	Dec., 1927
PIG IRON				
Bessemer, del., Pittsburgh	$20.01	19.96	18.86	19.36
Basic, valley	17.50	17.70	16.10	17.00
Basic, eastern, del. eastern Pa.	19.75	19.75	19.00	19.25
No. 2 foundry, del., Pittsburgh	19.76	19.56	18.61	19.01
No. 2 foundry, Chicago	20.00	20.00	18.25	18.50
*Southern No. 2, Birmingham	16.50	16.38	16.25	16.00
*Southern Ohio, No. 2, Ironton	18.50	18.25	19.00	19.00
**No. 2X, Virginia furnace	21.25	20.50	20.50	21.00
**No. 2X, eastern, del. Phila.	21.76	21.51	21.01	20.26
Malleable valley	18.00	17.90	17.10	17.35
Malleable, Chicago	20.00	20.00	18.25	18.50
Lake Superior charcoal, del. Chicago	27.04	27.04	27.04	27.04
Gray forge, val., del. Pittsburgh	18.76	18.66	18.01	18.56
Ferromanganese, del. Pittsburgh	109.79	109.79	109.79	102.79
*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.				
COKE				
Connellsville, furnace, ovens	2.75	2.85	2.75	2.60
Connellsville, foundry, ovens	3.75	3.75	3.75	3.60
SEMIFINISHED MATERIAL				
Sheet bars, open-hearth, Youngstown	34.00	33.60	33.00	34.00
Sheet bars, open-hearth, Pittsburgh	34.00	33.60	33.00	34.00
Billets, open-hearth, Pittsburgh	33.00	33.00	32.00	33.00
Wire rods, Pittsburgh	42.00	42.00	42.00	40.00

	Dec. 26, 1928	Nov., 1928	Sept., 1928	Dec., 1927
FINISHED MATERIAL				
Steel bars, Pittsburgh	1.90	1.95	1.90	1.80
Steel bars, Chicago	2.00	2.00	2.00	1.90
Steel bars, Philadelphia	2.27	2.27	2.22	2.12
Iron bars, Chicago	2.00	2.00	2.00	1.90
Shapes, Pittsburgh	1.90	1.95	1.90	1.80
Shapes, Philadelphia	2.06	2.11	2.06	2.08
Shapes, Chicago	2.00	2.00	2.00	1.90
Tank plates, Pittsburgh	1.90	1.95	1.90	1.80
Tank plates, Philadelphia	2.10c	2.15	2.10	2.05
Tank plates, Chicago	2.00	2.00	2.00	1.90
Sheets, black, No. 24, Pittsburgh	2.85	2.80	2.65	2.70
Sheets, blue anl., No. 10, Pittsburgh	2.10	2.05	2.00	2.10
Sheets gal., No. 24, Pittsburgh	3.60	3.55	3.50	3.60
Sheets, black, No. 24, Chicago	3.00	3.00	2.85	2.95
Sheets, blue anl., No. 10, Chicago	2.25	2.15	2.15	2.25
Sheets, galvanized, No. 24, Chicago	3.75	3.65	3.65	3.80
Plain wire, Pittsburgh	2.50	2.40	2.40	2.35
Wire nails, Pittsburgh	2.65	2.55	2.55	2.45
Tin plate, per base box, Pittsburgh	5.35	5.30	5.25	5.25
SCRAP				
Heavy melting steel, Pittsburgh	18.50	17.35	16.55	14.95
Heavy melting steel, eastern Pa.	15.00	15.90	14.65	14.00
Heavy melting steel, Chicago	14.50	14.50	12.90	11.95
No. 1 wrought, eastern Pa.	15.50	15.50	15.10	15.60
No. 1 wrought, Chicago	14.50	14.25	12.90	11.40
Rails for rolling, Chicago	16.50	16.50	15.80	14.10

Current Prices for Rolled Steel Products

PRICES IN CENTS PER POUND UNLESS OTHERWISE INDICATED

STEEL PLATES

Pittsburgh, base	1.90c to 2.00c
Philadelphia, del.	2.10c to 2.20c
New York, del.	2.175c to 2.275c
Boston, del.	2.265c to 2.415c
Chicago, base	2.00c to 2.10c
Cleveland, delivered	2.09c to 2.19c
Lackawanna, N. Y.	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Pacific Coast, c.i.f.	2.20c to 2.30c

STRUCTURAL SHAPES

Pittsburgh, base	1.90c to 2.00c
Philadelphia, del.	2.00c to 2.16c
New York, del.	2.145c to 2.195c
Boston, del.	2.265c to 2.415c
Chicago, base	2.00c to 2.10c
Cleveland, delivered	2.09c to 2.19c
Lackawanna, N. Y.	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Pacific Coast, c.i.f.	2.35c

BARS

SOFT STEEL

Pittsburgh, base	1.90c to 2.00c
Chicago, base	2.00c to 2.10c
Birmingham, base	2.15c to 2.25c
Lackawanna, N. Y., base	2.00c to 2.10c
Pacific Coast, c.i.f.	2.35c
Cleveland, base	1.90c to 1.95c
Philadelphia, del.	2.22c to 2.32c
New York, delivered	2.24c to 2.34c
Boston, delivered	2.265c to 2.415c
Pittsburgh, cold finishing	2.05c
Pittsburgh, forging quality	2.15c

RAIL STEEL

Chicago Heights	1.95c
Eastern mills	1.85c

IRON

Chicago, base	2.00c to 2.10c
New York, delivered	2.19c to 2.24c
Philadelphia, delivered	2.17c to 2.22c
Pittsburgh, refined	2.75c to 4.25c

REINFORCING

Pittsburgh billet, cut lengths	2.25c
Stock lengths from mill	2.00c
Chicago, billet	2.35c to 2.60c
Chicago, rail steel	2.05c
Chicago, rail steel, road and bridge work	1.95c to 2.05c
Philadelphia, cut lengths	2.57c

COLD FINISHED STEEL

Cold finished steel bars, drawn or rolled, Pitts., Chi., c.l.	2.20c
Shafting (turned, polished) Pittsburgh	2.20c
Shafting (turned, ground) mill (Depending on size, 1 3/16 to 7-inch)	2.55c to 3.00c
Cold finished steel bars, Cleve.	2.25c

TIN AND TERNE PLATE

Prices per 100-pound box Pittsburgh

*Tin plate, coke base	$5.35

Gary, Ind., base 10 cents higher.

Long ternes, primes, No. 24	4.00c to 4.10c

*Price subject to quantity differentials.

SHEETS

SHEET MILL BLACK

No. 24, Pittsburgh base	2.75c to 2.85c
No. 24, Philadelphia, delivered	3.07c to 3.17c
No. 24, Gary, Indiana Harbor	2.95c
No. 24, Chicago, delivered	3.00c
No. 24, Birmingham, base	3.00c

TIN MILL BLACK

No. 28, Pittsburgh, base	3.00c
No. 28, Gary, base	3.10c

GALVANIZED

No. 24, Pittsburgh, base	3.50c to 3.60c
No. 24, Philadelphia, delivered	3.82c to 3.92c
No. 24, Gary, Indiana Harbor	3.70c
No. 34, Chicago, delivered	3.75c
No. 24, Birmingham, base	3.75c

BLUE ANNEALED

No. 10, Pittsburgh, base*	2.00c to 2.10c
No. 24, Philadelphia, delivered	2.32c to 2.42c
No. 10, Gary, Indiana Harbor	2.20c
No. 10, Chicago, delivered	2.25c
No. 10, Birmingham, base	2.25c

*Plus 0.10 cents for 45 inches or wider.

AUTOMOBILE

No. 20, Pittsburgh, base	4.10c

FURNITURE

No. 24, Grade A, Pittsburgh	3.90c to 4.00c
No. 24, Grade B, Pittsburgh	3.75c to 3.85c

(Turn to the following page)

to 100,000 tons of plates in prospect from freight car work now pending, are figuring on 8000 to 10,000 tons of southwestern tank work. For the Gulf Refining Co. these mills in the past week booked 1700 tons of plates. As the new Bethlehem base of 2.00c to 2.10c, Coatesville, on plates is applied it is evident that some users will benefit $1 a ton for the first quarter and the fringe of eastern mill competition has been pushed westward toward Pittsburgh district producers.

18,500-Ton Shape Award at Chicago

Farm implement and automotive industry specifications for soft steel bars dominate that market at Chicago. In northern Ohio, specifications for bars are comparable to the similar period of November, which is a favorable showing for December, and ahead of the corresponding period of last December. Some large structural projects maturing at Chicago, plus the unusual tonnage pending at Philadelphia, promise marked activity early in the new year. The American Bridge Co. has booked 18,500 tons of structurals for the new Board of Trade building in Chicago. Bids are being taken on a highway bridge across Chesapeake bay requiring 35,000 tons of steel. In shapes and bars, as with plates, the extension of current prices into the first quarter, excepting the adjustment in eastern Pennsylvania, has erased the usually sharp line differentiating quarters. If action is taken shortly as expected on the 4631 freight cars on inquiry by the Santa Fe railroad and 3100 by the Missouri Pacific railroad, western carbuilders will be staked to an early year backlog of good proportions. The 1200 cars placed by the Louisville & Nashville railroad will be built in the Pittsburgh district. The Great Northern has bought 300 ore cars. The Wabash has ordered 35 cars.

Despite an increasing surplus, producers of beehive furnace coke are holding the Connellsville market at a minimum of $2.75. Most large users have covered quietly for their first quarter requirements. Foundry coke producers look for a heavy expansion in shipments immediately following the turn of the year. By-product coke prices in practically all districts have been extended unchanged into the new year, and production at the ovens is not far under capacity.

Many Mills Down for Repairs

Steelmaking operations this week are spotty owing to the fact that some finishing departments shut down only from Dec. 22 to 26 while others are down the entire week for repairs. In general, operations throughout the industry average 80 to 85 per cent. In the Mahoning valley one open hearth has been lighted, giving the independents 45 out 51 active. Bar mills at Chicago are at 80 per cent and rail and plate mills at 70. Pittsburgh mills are averaging 80 per cent.

Composite Market Average

Based on Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structural Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

This week (Dec. 24, 1928)	$36.24
Last week (Dec. 18, 1928)	36.24
One month ago (November, 1928)	36.02
Three months ago (September, 1928)	35.19
One year ago (December, 1927)	35.09
Ten years ago (December, 1918)	57.24
Fifteen years ago (December, 1913)	23.29

The IRON TRADE REVIEW composite of fourteen leading iron and steel products stands unchanged this week at $36.24. It promises to conclude the year at its peak. This barometer was $36.16 two weeks ago.

Current Rolled Steel Prices

PRICES IN CENTS PER POUND UNLESS OTHERWISE INDICATED

SEE ALSO PRECEDING PAGE

HOOPS, BANDS, STRIPS

Hot strip, to 6-in., Pitts.	1.90c to 2.00c
Hot strip, 6 1/16 to 24-in., Pitts.	1.80c to 1.90c
Hot rolled strip, 12 to 24-inch 16 gage and heavier, coils or cut length, 1.90c to 2.00c plate basis, or 2.10c blue annealed basis.	
Hot strip, bands, under 6-in. Chicago	2.10c to 2.30c
6 to 20 in.	2.00c to 2.10c
Cold rolled strip, hard coils, 16 inches and under by 0.100-inch and heavier, base Pitts., Cleve. (3 tons and over)	2.85c to 2.95c
Worcester, Mass. (3 tons and over)	3.10c to 3.20c

ALLOY STEEL

Hot Rolled
F.o.b. Mills

Alloy Quality Bar Base is 2.65c to 2.75c

S.A.E. Series Number	Alloy differential	Net, 100 lb. bars
2000	0.25	$3.00
2100	0.55	3.30
2300	1.50	4.25
2500	2.25	5.00
3100	0.55	3.30
3200	1.35	4.10
3300	3.80	6.55
3400	3.20	5.95
4100 0.15-0.25 Mo.	0.50	3.25
4100 0.25-0.40 Mo.	0.70	3.45
4600 0.20-0.30 Mo. 1.25-1.75 Ni.	1.05	3.80
5100 0.60-0.90 Cr.	0.35	3.10
5100 0.80-1.10 Cr.	0.45	3.20
5100 Chrome Spring	0.20	2.95
6100 Bars	1.20	3.95
6100 Spring Steel	0.95	3.70
Chrome Nickel Vanadium	1.50	4.25
Carbon Vanadium	0.95	3.70
9250 (flats)	0.25	3.00
9250 (rounds, squares)	0.50	3.25

TUBING

Boiler

Carload Discounts—Less-carloads 4 points Lower—F.o.b. Pittsburgh Mills

Steel 3¼ to 3¾-inch	42½
Charcoal iron, 3¼ to 4½-inch	9
Seamless hot rolled 3¼ to 3½-inch	56

Further discounts of six 5 per cents for 21,000 pounds or more on lap welded steel. On charcoal two 10's and one 2½ on 12,000 pounds or more.

COLD DRAWN SEAMLESS

F.o.b. mill in desirable quantities

Random lengths, over 5 feet	55 per cent
Selected lengths, 1 to 18 feet	53 per cent

WIRE PRODUCTS

F.o.b. Pittsburgh, Cleveland, Ironton base

(Per pound)

	Dealer trade	Large jobbers
Bright plain wire, 6 to 9 gage	2.60c	2.50c
Annealed field wire	2.75c	2.65c
Galvanized wire	3.20c	3.10c
Barbed wire, galvanized	3.40c	3.30c

(Per 100-pound keg)

Wire nails	$2.75	$2.65
Galvanized nails	4.75	4.65
Polished staples	3.20	3.10
Galvanized staples	3.45	3.35
Cement coated nails	2.75	2.65

Joliet, DeKalb and Waukegan, Ill., Anderson, Ind., and Chicago prices $1 per ton over Pittsburgh-Cleveland-Ironton base on products made there; Duluth $2 higher, Worcester, Mass., and Fairfield, Ala., $3 higher.

Woven wire fencing, retailers, Pittsburgh-Cleveland, net ton $65.

Anderson, Ind., $1 higher, Chicago $2 higher, and Duluth and Birmingham $3 higher.

CUT NAILS, CHAIN, PILING

Cut nails, c.l., f.o.b. mills	2.75c
Cut nails, l.c.l. f.o.b. mills	2.85c
Chain, 1-in., proof coil, Pitts.	6.00c
Sheet piling base, Pittsburgh	2.25c

CAST IRON WATER PIPE

Prices per net ton

Class B pipe

Six-inch and over, Birming'm	$37.00 to 38.00
Four-inch, Birmingham	41.00 to 42.00
Four-inch, Chicago	49.20 to 50.20
Six-inch to 24-inch, Chicago	45.20 to 46.20
Four-inch, New York	41.60 to 43.10
Six-inch and over, New York	38.60 to 40.10
Standard fittings, Bir. base	$100.00

Six to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, $5 higher.

Class A pipe is $4 higher than Class B.

IRON AND STEEL PIPE

Base Discounts Pittsburgh and Lorain, O., to Jobbers in Carloads

	Black	Galv.
1 to 3-inch butt steel*	62	50*
1 to 1½-inch butt iron	30	13

Indiana Harbor, Ind., and Evanston, Ill., 2 points less, Chicago, del., 2½ points less.

*To large jobbers these discounts are increased on black by 1 point and a supplementary discount of 5 per cent on galvanized by 1½ points with a supplementary 5 per cent.

RAILS, TRACK MATERIAL

Standard bessemer rails, mills	$43.00
Standard open-h'th rails, mill	$43.00
Relaying rails, St. Louis	$24.00 to 31.00
Relay rails, Pitts. 60 to 90 lb.	$22.00 to 27.00
Light rails, 25 to 45, mills	$36.00
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.80c
Spikes, small railroad, 7/16-inch and smaller, Pitts.	2.80c
Spikes, boat and barge, Pitts.	3.00c
Spikes, railroad, Chicago	2.80c
Track bolts, Pitts., steam roads	3.80c
Track bolts, Pitts., stand, jobbers	70 off list
Track bolts, Chicago	3.80c
Tie plates, Chicago, Pitts.	$43.00

BOLTS AND NUTS

Birmingham and Chicago

Discounts are for legitimate jobbing or large consuming trade purchasing in full-case lots, apply to lists of April 1, 1927.

Small lots are 55 to 60 per cent off.

CARRIAGE BOLTS

All sizes, cut thread	60 to 70 off
Rolled thread ⅝ x 6 and smaller take 10 per cent lower list.	
Eagle list	60 to 70 off

MACHINE BOLTS

All sizes, cut thread	60 to 70 off
Rolled thread ⅝ x 6 and smaller take 10 per cent lower list.	
Lag Screws	60 to 70 off
Plow bolts, Nos. 1-2-3-7 heads	60 to 70 off
Tap bolts	60 to 70 off
Blank bolts	60 to 70 off
Stud bolts without nuts	60 to 70 off
Stove bolts, 75, 20, 10 and 5 off in pkgs., 75, 20, 10 and 5 with 2½ off in bulk.	
Tire bolts	60-5 off

Nuts

Semifinished	60 to 70 off

HEXAGON CAP SCREWS

Milled	80-10-10 off
Upset 1 in. diam. and smaller	85-5 off

SQUARE HEAD SET SCREWS

Milled	80-10 off
Upset 1 in. diam. and smaller	80-10-10 off

RIVETS

Struct., c.l., Pitts.-Cleve.	2.80c to 2.90c
Structural, c.l., Chicago	3.00c
**7/16-inch and smaller, Pitts.	70 and 10 off
Chi., Cleve.	70 to 70 and 10 off

**Some makers quoting 70 off with freight allowed on 300 pounds or more.

WASHERS

Wrought, c.l., Pitts. dist.	$6.50 to 6.75 off
Wrought, c.l., Chicago dist.	$6.70 to 6.90 off
Lock: To dealers	85-5 off
Lock: To consumers	85 off

Raw Materials and Semifinished Products

SEMIFINISHED MATERIAL

Prices Per Gross Ton

BILLETS AND BLOOMS

4 x 4-inch base

Pittsburgh, open-hearth	$33.00
Pittsburgh, bessemer	33.00
Youngstown	33.00
Cleveland	34.00
Philadelphia	38.30 to 39.30
Chicago	35.00
Forging, Chicago	40.00
Forging, Pittsburgh	38.00
Forging, Philadelphia	43.30

SHEET BARS

Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00
Chicago	35.00

SLABS

Pitts., Young., and Cleve.	$33.00

WIRE RODS

Pittsburgh, Cleveland	$42.00
Chicago	43.00

SKELP

All grades, Pittsburgh	1.85c to 1.90c

IRON ORE

LAKE SUPERIOR ORE

Per Gross Ton, Lower Lake Ports

Old range bessemer, 51½%	$4.55
Mesabi bessemer, 51½%	4.40
Old range nonbessemer 51½%	4.25
Mesabi nonbessemer, 51½%	4.25

EASTERN LOCAL ORES

Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic, 56-63%	8.00
Copper free low phosphorus 58 to 65 per cent	nominal

FOREIGN ORE

Cents per unit, alongside docks, Atlantic ports

Foreign manganiferous ore, 45-55% iron, 6-8% manganese	10.50 to 11.00
North African low phosphorus	10.00 to 11.00
Swedish foundry or basic, 65%	9.00 to 9.50
Spanish and North African basic, 50 to 60 per cent	nominal
Newfoundland foundry, 55%	8.50

MANGANESE ORE

Prices do not include duty of 1 cent per pound of metallic manganese contained.

Brazilian	35 cents
Indian	35 to 36 cents
Caucasian (53-55 per cent)	36 to 38 cents

FLUORSPAR

85 and 5 per cent grade

Washed gravel, Kentucky and Illinois mines, per net ton	$18.00
Washed gravel, imported duty paid, east, tidewater, gross ton	$19.40 to 20.40

REFRACTORIES

FIRE CLAY BRICK

Per 1000 f.o.b. works

First Quality

Pennsylvania	$43.00 to 46.00
Ohio	43.00 to 46.00
Illinois	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Maryland	43.00 to 46.00
Georgia and Alabama	40.00 to 45.00

Second Quality

Pennsylvania	35.00 to 38.00
Ohio	35.00 to 38.00
Illinois	35.00 to 38.00
Kentucky	35.00 to 38.00
Missouri	35.00 to 38.00
Maryland	35.00 to 38.00
Georgia and Alabama	30.00 to 35.00

SILICA BRICK

Pennsylvania	43.00
Joliet, Ill., East Chicago, Ind.	52.00
Birmingham	50.00 to 51.00

MAGNESITE BRICK

Per Net Ton

9 x 4½ x 2½	65.00

MAGNESITE

Net Ton Chester, Pa., and Baltimore base

Dead-burned grain magnesite	40.00

CHROME BRICK

Net Ton Chester, Pa., and Baltimore base

9 x 4½ x 2½	45.00

Pig Iron

Heavy Shipments in January Indicated by Specifications—Market Is Steady—Active Spot Demand Also in Prospect

THE seasonal letdown in pig iron shipments this December has been less pronounced than for the month in many years. Prospects are good for heavy resumption in January, and many producers believe the tonnage to be moved in that month will equal or exceed that of October or November, which were the best months of 1928. The melt continues at a high rate, and shipping instructions on contracts call for unusually heavy deliveries for January. An active spot demand also is assured for the greater part of January. The leading transaction of the past week was the purchase of 4000 to 5000 tons by the General Electric Co. for eastern plants. Prices are steady. The valley market on No. 2 foundry generally is held at $18, base. Bessemer sales are limited.

PITTSBURGH, Dec. 24.—Pig iron is exhibiting the quietness common at this period, although the steady rate of shipments on contracts indicate that consumption is well maintained. The continued reduction of furnace stocks is seen as a factor conducive to strength. Some merchant producers of basic iron are well booked over the next month and although an acute shortage of this grade is not looked for immediately, a large surplus is expected to be lacking in the first quarter. Booking of new business has been quiet, orders generally restricted to lots of a few hundred tons, although a local melter recently placed a lot of No. 2 foundry estimated at more than 1000 tons for first quarter. On this tonnage $17.50, valley, was paid, although bids were submitted more than a month ago. Sellers profess now to be holding to $18, at which a fair aggregate of small lots have been booked. Bessemer sales are limited, but shipments of at least one interest exceed production. Bessemer holds at $18.25 to $18.50, valley.

Boston, Dec. 24.—Pig iron sales the past week were not heavy. Probably 2000 tons was sold, being well divided between the Buffalo and Mystic furnaces. Prices rule fairly firm. There is a feeling that some good tonnages will be sold early in the new year, based on the fact a number of foundries are already specifying strongly against contracts. This will leave a dearth of iron on hand in a short period. Foundries for the most part have been quite active the past several months.

New York, Dec. 24.—General Electric Co. has closed for the major portion of the iron its various plants will consume in the first quarter. The orders placed are reported to have aggregated 4000 to 5000 tons. Other business is small. The melt continues good, and although some foundries will close for inventory, outlook for consumption of iron during first quarter is considered bright. Recent price advances have not been firmly established. Buffalo foundry iron for this district is $17.50 to $18, base, Buffalo. Eastern Pennsylvania foundry iron is $20.50 to $21, base, furnace. English low phosphorus iron continues to be sold occasionally at prices ranging from $22.50 to $23, duty paid, furnace.

Philadelphia, Dec. 24.—Several thousand tons of pipe iron has been placed by eastern pipe companies in the last few days. Otherwise current activity in the pig iron market is rather small. Prices continue $20.50 to $21, base, eastern Pennsylvania furnace.

Buffalo, Dec. 24.—Pig iron sales and inquiries have dwindled. Shipments during the first three weeks of December were larger than those of the corresponding period of November. Prices are firm.

Youngstown, O., Dec. 24.—Relighting of Grace blast furnace several weeks ago by the Youngstown Sheet & Tube Co. at its Brier Hill works, has been followed by the blowing out a few days ago of Jeanette stack at Brier Hill for relining. This is the only change in valley blast furnace activities since the Struthers Iron & Steel Co. blew in its merchant stack a fortnight ago. Pig iron sales here are few and small but shipments continue satisfactory. Sharper competition is being encountered by valley stacks outside the valley. No. 2 foundry and basic are holding at $18, valley, and malleable at $18 to $18.50.

Cleveland, Dec. 24.—Pig iron shipments this month have fallen slightly below those of November, but producers are well satisfied with the situation. There has been less interruption to shipments this December due to holidays and inventories than in many years, leading producers report. Advance shipping instructions for January indicate there will be a rush for deliveries. The past week's orders booked by furnace interests with headquarters at Cleveland totaled 15,000 tons. Spot orders now predominate. Inquiries have tapered off. Prices are firm. Cleveland furnaces continue to quote $18.50, base, furnace, for local delivery, and $18 for shipment in outside competitive territory.

Cincinnati, Dec. 24.—Three railroad companies are in the market for miscellaneous lots of pig iron, aggregating 1600 tons. A central Ohio melter wants 600 to 1000 tons. A local seller booked one order in the past week for 2500 tons. The sale of 150 tons of charcoal iron also is noted. The market generally is quiet. Prices are steady.

Chicago, Dec. 24.—Shipments of pig iron from furnace yards in December show a slight decline from the November rate. The fact that buyers have covered for first quarter has given furnaces a chance to balance their grades and analyses, but stocks still are low. Better production can be obtained now, as less switching is required for the output of various grades. Spot sales have dropped off,

(*Concluded on Page* 1683)

Pig Iron Prices

Per Gross Ton

Bessemer, valley furnace	$18.25 to 18.50
Bessemer, del. Pittsburgh	20.01 to 20.26
Basic, valley furnace	17.50 to 18.00
Basic, del. Pittsburgh	19.26 to 19.76
Basic, Buffalo furnace	17.50
Basic, del. eastern Pa.	19.75 to 20.00
Malleable, valley furnace	18.00 to 18.50
Malleable, del. Pittsburgh	19.76 to 20.26
Malleable, del. Cleveland	19.50
Malleable, Chicago furnace	20.00
Malleable, Buffalo furnace	19.00
Malleable, del. eastern Pa.	21.50 to 22.00
Malleable, Granite City fur.	20.50
No. 1 foundry, Chicago furnace	20.50
No. 1X, eastern del., Phila.	22.26 to 22.76
No. 1X, Buffalo furnace	20.00
No. 2 foundry, valley furn.	18.00
No. 2 foundry, del. Pittsburgh	19.76
No. 2 plain, Buffalo furnace	18.50
No. 2 foundry, Chicago furnace	20.00
No. 2 foundry, Granite City	20.00
No. 2 foundry, Ironton furnace	18.50
No. 2 foundry, del. Cleveland	19.50
No. 2 plain, del., Phila.	21.26 to 21.76
No. 2 plain, Virginia furnace	20.75
No. 2 plain eastern Pennsylvania, del. Boston	24.15 to 24.65
No. 2 plain, N. J., tidewater	20.78 to 21.28
No. 2 Alabama, Birmingham	16.50 to 17.00
No. 2 Alabama, del. Cincinnati	20.19 to 20.69
No. 2 Tenn., Birmingham base	16.50
No. 2 Tenn., del. Cincinnati	20.19
No. 2 Alabama, del. Chicago	22.51 to 23.01
No. 2 Alabama, del. Cleveland	22.76 to 23.26
No. 2 Alabama, del. St. Louis	21.42
No. 2X, east, N. J., tidewater	21.28 to 21.78
No. 2X, eastern, del. Phila.	21.76 to 22.26
No. 2X, foundry, Buffalo furnace	19.00
No. 2X, eastern, del. Boston	24.65 to 25.15
No. 2X, Virginia furnace	21.25
Gray forge, val., del. Pittsburgh	19.26
Low phos., standard, valley	27.00
Low phos., standard, Phila.	24.26 to 24.76
Low phos., copper bearing fur.	23.00 to 23.50
Charcoal, Birmingham	28.00
Charcoal, Superior, del., Chicago	27.04

CANADIAN PRICES

No. 2 foundry, del. Toronto	23.60
No. 2 foundry, del. Montreal	25.00
Malleable, del. Toronto	23.60
Malleable, del. Montreal	25.00
Basic, del. Montreal	24.00

Silvery iron, Jackson county, O., furnaces, in per cents: 5—$23 to $24; 7—$25 to $26; 8—$26 to $27; 9—$27 to $28; 10—$29 to $30; 11—$31 to $32; 12—$33 to $34; 13—$35 to $36.

Bessemer ferrosilicon, Jackson county, O., furnaces, in per cents: 10—$31 to $32; 11—$33 to $34; 12—$35 to $36; 13—$37 to $38; 15—$41.50 to $42.50; 16—$43 to $44.

Coke

Surplus Furnace Fuel Holds Down Connellsville Prices—Foundries Accept Freely

PRESENCE of considerable surplus beehive furnace coke in the market holds the price of the furnace grade down to $2.75 Surplus is due to delay in blowing in some blast furnaces which were scheduled to take coke. Most consumers have covered for first quarter, some at $2.80 and $2.85. The movement of foundry coke is expected to resume in large proportions after inventory.

Pittsburgh, Dec. 24.—Beehive coke producers are able to maintain the $2.75 price on spot offerings of furnace fuel despite the fact considerable surplus is in the market. This latter condition is due in a measure to delay in blowing in of some furnaces which contracted for coke to April 1. Oven operations have not been markedly reduced over the past few weeks. Practically all consumers are covered for first quarter. Contracts placed some time ago when the market was in a stronger position are understood to have carried $2.80 and $2.85 figures. Foundry coke is quiet. Prices are steady on spot and contract business at $3.75 to $4.85, depending upon grades. Heating coke varies from $2.30 to $2.60, with demand restricted by warm weather of preceding weeks. The H. C. Frick Coke Co. has closed down for an indefinite period its Palmer mine, one of the largest in the Uniontown, Pa., region. W. J. Rainey Inc. has purchased from the Hillman interests a tract of about 3000 acres of by-product and gas coal land in the Connellsville district.

Beehive coke production during the week ended Dec. 15 totaled 60,000 tons, compared with 60,100 tons the preceding week and 41,400 tons the corresponding week of last year, according to the *Connellsville Courier*.

Boston, Dec. 24.—The cooler weather that has spread throughout New England resulted in a better demand for domestic sizes of coke from retailers in the past week. Wholesalers have been taking good tonnages right along, so that the reduction of their piles at this time is taking place. Foundries continue to take enough in carlots or so to maintain activity. Prices continue firm.

New York, Dec. 24.—Although consumption of foundry coke in this territory continues heavy, specifications are at a low rate due to the approach of inventory. By-product foundry coke continues $9 to $9.40, delivered at Newark, N. J., and $11, delivered at most New England consuming points. Beehive foundry coke continues $3.75 to $4.25, Connellsville, Pa., and $4.85 Latrobe, Pa.

Chicago, Dec. 24.—Users of by-product foundry coke have contracted largely for the first half on the basis of $8, ovens, and $8.75 for local delivery. Shipments are at the high rate of the past 30 days, and are practically equivalent to production.

Cincinnati, Dec. 24.—December coke business has been larger than the December average for more than a decade, distributors and manufacturers say. Some large inquiries are pending, Prices are steady.

St. Louis, Dec. 24.—Current purchasing of metallurgical coke holds up in excellent shape, and specifications are good for the most part, reflecting an unusually heavy melt for this time of year. While not building up stocks, users are apparently anxious to get in their fuel, and some anticipations of contract quotas are reported. Demand for coke for heating purposes remains slow. The movement of industrial coke is satisfactory, particularly to the west and northwest. Public-utility companies are specifying heavily.

Birmingham, Ala., Dec. 24.—Coke production will not be disturbed over the holiday season and shipments will be steady. Albama coke holds at $5 per ton, base, for foundry grade. Shipments into the Middle West still are steady. Local consumption continues with prospects of an increase shortly. Iron and steel producers are making but little more coke than needed in their own plants.

Coke Prices

Prices per Net Ton

Beehive Ovens	
Connellsville furnace	$2.75
Connellsville foundry	3.75 to 4.85
New River foundry	6.50 to 7.00
New River furnace	6.50
Wise county foundry	4.50 to 5.25
Wise county furnace	3.75 to 4.75
By-Product Foundry	
Newark, N. J., del.	9.00 to 9.40
Chicago, ovens	8.00
New England, del.	11.00
St. Louis, del.	9.00
Birmingham	5.00
Indianapolis, del.	8.25
Ashland, Ky.	7.00
Portsmouth, O.	7.00
Detroit, ovens	8.50
Buffalo, ovens	9.00

Ferroalloys

Shipments Slower After Satisfactory Year—Market Is Firm

Pittsburgh, Dec. 24.—Activity in ferroalloys approximate steelmaking operations. With fourth quarter prices of $109.79, delivered Pittsburgh, for ferromanganese, and $83.50 for ferrosilicon, continued into first quarter, current specifications lack the speculative stimulus. Shipments are made steadily, although at a slower rate than a month ago. Total tonnage is seasonally high. A similar situation exists in spiegeleisen. Most first half contracts were signed at previously prevailing figures of $30 to $33 before the advance of $1 a ton for spot business. Prompt orders are few, and are billed at $34. Fluorspar is firm at $18. Although most ferromanganese consumers have signed for their half-year requirements, bookings in fluorspar have been light.

Chicago, Dec. 24.—Sales and specifications of ferroalloys this year are estimated to have exceeded those of 1927 by 15 to 18 per cent. This was due to the high level of steelworks operations and to the fact that capacity has been enlarged in the Chicago district for production of steel castings. High carbon ferrochromium is becoming more widely used in production of gray iron castings. Ferromanganese is unchanged at $105, seaboard, or $112.56, delivered Chicago. Fifty per cent ferrosilicon is $83.50 to $88.50. The price of $34, eastern furnace, for the base grades of spiegeleisen in carload lots has been untested.

Myers Gives Resignation

Washington, Dec. 24.—Chairman Abram F. Myers, of the federal trade commission, announced today that he has tendered his resignation to President Coolidge. This was done several days ago, following his acceptance of the office of president and general counsel of the Allied States Association of Motion Picture Exhibitors. Announcement was withheld pending acceptance of the resignation, but the fact of Mr. Myers' affiliation with the Allied States association became known through the trade press. In addition to his retainer by the motion picture exhibitors, Mr. Myers will practice law in Washington. He will open his offices immediately following acceptance of his resignation.

Ferroalloy Prices

Ferromanganese, 78 to 82 per cent tidewater duty paid	$105.00
Ferromanganese, del. Pittsburgh	109.79
Spiegeleisen, 19 to 21 per cent domestic furnace, spot†	34.00
*Ferrosilicon, 50 per cent, freight allowed, carloads	83.50
*Do., less carload	88.50
Do., 75 per cent	130.00 to 150.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. per lb. con., del.	11.00
Do., for spot delivery	11.50
Ferrotungsten, stand., lb. cont.	1.04 to 1.10
Ferrovanadium, 30-40 per cent, per lb., contained, on analysis	3.15 to 3.65
Ferro-carbon-titanium carload, producers plant, net ton	200.00
Ferrophosphorus, per ton, carload, 17 to 19 per cent, Rockdale, Tenn., basis (18 per cent)	91.00
Ferrophosphorus, electrolytic, per ton, carload, 23-25% f.o.b. Anniston, Ala. (24 per cent)	122.50

†Quantity diff. apply on 100 tons and over.
*These prices contract, spot $5 higher.

Scrap

Dealers Buying but Averse to Making Future Sales—Prices Are Unchanged

CONDITIONS in iron and steel scrap are quiet, with dealers buying rather than selling. Apparently sentiment favors a higher price range in the new year and dealers are weary of obligating themselves for future delivery at present prices. Consumers have not been buying heavily.

Chicago, Dec. 24.—Dealers are largely on the buying side of the iron and steel scrap market, and are cautious about taking orders at present prices. General sentiment is strong as consumption has been at a steady rate, and dealers are eager to cover outstanding orders. Acute scarcities have developed in several lines, notably railroad malleable, which has been selling as high as $17.50. Consumer offers of $17.75 have been refused. Malleable scrap consumption has been growing, and that grade is difficult to obtain. Heavy melting steel is strong at $14.50 to $15. Dealer transactions the past several days have been above $14.75, and railroad offerings have been closed at above $15.25, gross, on tracks. Mills continue to take moderate tonnages at $15. Low phosphorus plate scrap and punchings are 25 to 50 cents higher than a week ago. Short rails, 3 feet and under, are quoted 25 cents higher. Several hundred tons of cast borings were sold at $12.50, an advance of 25 cents.

Boston, Dec. 24.—As has been the situation in most other lines for the past week, the scrap market went

Iron and Steel Scrap Prices

Corrected to Tuesday noon. Gross tons delivered to consumers, except Detroit where dealers' buying prices are shown

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	$11.50 to 12.50
Boston, dealers	11.00 to 11.50
Boston No. 2	10.00 to 10.50
Buffalo, No. 1	16.00 to 16.50
Buffalo, No. 2	13.25 to 14.00
Chicago	14.50 to 15.00
Cincinnati, deal	13.25 to 13.75
Cleveland, No. 1	14.75 to 15.25
Cleveland, No. 2	14.25 to 14.75
Detroit, No. 1	13.50 to 14.00
Detroit, No. 2	11.00 to 11.50
East Pa., del. mill	15.00 to 15.50
East. Pa., deal. del.	14.50 to 15.00
N. Y., deal., R. R.	11.50 to 12.50
N. Y., deal., yd.	9.00 to 9.50
Pittsburgh, No. 1	18.00 to 19.00
St. Louis, No. 1	13.25 to 13.75
St. Louis, No. 2	12.50 to 13.00
Valleys, No. 1	16.75 to 17.00

COMPRESSED SHEETS

Buffalo	14.75 to 15.25
Chicago	13.00 to 13.50
Cleveland	14.50 to 15.00
Detroit	13.50 to 14.00
Pittsburgh	18.00 to 19.00
Valleys	16.50 to 17.00
E. Pa. new mat	13.00 to 13.50

BUNDLED SHEETS

Buffalo	11.50 to 12.00
Cincinnati, deal	10.50 to 11.00
Cleveland	12.00 to 12.25
Eastern Pa.	11.00 to 11.50
Pittsburgh	16.50 to 17.00
St. Louis	8.50 to 9.00

SHEET CLIPPINGS LOOSE

Chicago	7.50 to 8.00
Cincinnati	9.50 to 10.00
Detroit	8.50 to 9.00
St. Louis	8.50 to 9.00

STEEL RAILS, SHORT

Birmingham	12.00 to 13.00
Boston	8.25 to 8.75
Buffalo	17.00 to 18.00
Chicago	17.25 to 17.75
Cincinnati, deal	19.00 to 19.50
Detroit	17.00 to 17.50
Pittsburgh	19.00 to 19.50
St. Louis	17.50 to 18.00

STOVE PLATE

Birmingham	13.00 to 13.50
Boston consumers	11.00 to 11.50
Buffalo	14.00 to 14.50
Chicago, net	12.25 to 12.75
Cinn., deal., net	9.50 to 10.00
Cleveland	10.00 to 11.00
Detroit, net	9.50 to 10.00
Eastern Pa.	12.00 to 12.50
N. Y., deal., mill	8.25 to 8.75
Pittsburgh	11.50 to 12.00
St. Louis	12.25 to 12.75

SHOVELING STEEL

Chicago	14.50 to 15.00
Pittsburgh	18.50 to 19.00
St. Louis	13.25 to 13.75

KNUCKLES, COUPLERS SPRINGS

Buffalo	17.50 to 18.00
Chicago	16.25 to 16.75
Eastern Pa.	17.00 to 17.50
Pittsburgh	19.50
St. Louis	15.00 to 15.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	17.50 to 18.00
Cincinnati, deal	15.00 to 15.50
Eastern Pa.	19.00 to 20.50
Pitts. billet and bloom crops	21.00 to 21.50
Cleve. billet and bloom crops	17.00 to 17.50

FROGS, SWITCHES, GUARDS

Chicago	15.75 to 16.25
St. Louis	15.00 to 15.50

ANGLE BARS—STEEL

Buffalo	14.00 to 14.50
Chicago	16.25 to 16.75
St. Louis	14.25 to 14.75

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	9.50 to 10.50
Boston, dealers	11.50 to 12.00
Buffalo, No. 1	12.00 to 12.50
Buffalo, No. 2	14.50 to 15.50
Chicago, No. 1	14.50 to 15.10
Chicago, No. 2	14.50 to 15.00
Cinn., No. 2	13.25 to 13.75
Eastern Pa.	15.00 to 16.00
N. Y., No. 1 deal.	11.00 to 11.50
Pittsburgh, No. 1	13.50 to 14.00
Pittsburgh, No. 2	18.00 to 19.00
St. Louis, No. 1	13.00 to 13.50
St. Louis, No. 2	13.25 to 13.75

WROUGHT PIPE

Boston, dealers	9.50 to 10.00
Eastern Pa.	14.50 to 15.00
Boston	9.00 to 9.50
New York, deal	10.25 to 10.75

YARD WROUGHT

Boston	9.00 to 9.50
Eastern Pa.	15.00 to 15.50

BUSHELING

Buffalo	14.00 to 15.00
Chicago, No. 1	13.00 to 13.50
Chicago, No. 2	8.50 to 9.00
Cinn., No. 1 deal.	11.00 to 11.50
Cinn., No. 2	7.00 to 7.50
Cleveland, No. 1	12.25 to 12.50
Cleveland, No. 2	11.25 to 11.50
Detroit, No. 1	12.50 to 12.75
Detroit, mixed	7.50 to 8.00
Pittsburgh, No. 1	15.00 to 15.50
St. Louis, No. 1	10.00 to 10.50

MACHINE SHOP TURNINGS

Birmingham	9.00 to 9.50
Boston	6.25 to 6.50
Buffalo	7.75 to 8.25
Chicago	8.00 to 8.50
Cincinnati, deal	9.50 to 10.00
Cleveland	9.50 to 10.00
Detroit	8.50 to 8.75
Eastern Pa.	11.00 to 11.50
New York, deal	7.00 to 7.50
Pittsburgh	12.50 to 13.00
St. Louis	9.00 to 9.50

MIXED BORINGS, TURNINGS
For blast furnace use

Boston, dealers,	5.75 to 6.00
Buffalo	11.00 to 11.50
Cincinnati, deal	10.00 to 10.50
Cleveland	11.25 to 11.75
Detroit	9.50 to 9.75
Eastern Pa.	9.50 to 11.00
New York, deal	6.25 to 7.00
Pittsburgh	12.50 to 13.00

CAST IRON BORINGS

Birmingham, chem.	13.00 to 13.50
Birmingham, plain	9.00 to 9.50
Boston, chem.	10.00 to 10.25
Boston, dealers	5.75 to 6.50
Buffalo	11.00 to 11.50
Chicago	12.25 to 12.50
Cincinnati, deal	10.00 to 10.50
Cleveland	11.00 to 11.50
Detroit	9.50 to 9.75
Eastern Pa.	11.00 to 11.50
Eastern Pa., chem.	14.50 to 15.00
New York, deal	6.75 to 7.00
Pittsburgh	12.50 to 13.00
St. Louis	9.50 to 10.00
Valleys	12.50 to 13.00

PIPE AND FLUES

Chicago, net	9.75 to 10.25
Cincinnati, deal	8.50 to 9.00

RAILROAD GRATE BARS

Buffalo	12.50 to 13.00
Chicago, net	12.50 to 13.00
Cincinnati	10.00 to 10.50
Eastern Pa.	12.00 to 12.50
New York, deal	9.25 to 9.75
St. Louis	11.00 to 11.50

FORGE FLASHINGS

Boston, dealers	9.00 to 9.25
Buffalo	12.25 to 13.25
Chicago	9.50 to 10.00
Cleve., over 10 in.	12.25 to 12.75
Detroit	11.50 to 12.00
Pittsburgh (light)	14.00 to 15.00

FORGE SCRAP

Boston, dealers	7.25 to 7.50
Chicago	17.00 to 17.50
Eastern Pa.	12.00 to 13.00

ARCH BARS AND TRANSOMS

Chicago, net	21.00 to 21.50
St. Louis	22.00 to 22.50

Iron, Steel Works Scrap

AXLE TURNINGS

Boston, deal	6.75 to 7.00
Buffalo	12.00 to 12.50
Chicago	12.00 to 12.50
Cleveland	12.50 to 13.00
Eastern Pa.	12.00 to 13.00
Pittsburgh	15.50 to 16.00
St. Louis	11.50 to 12.00

STEEL CAR AXLES

Birmingham	16.00 to 17.00
Boston, ship point	16.00 to 16.50
Buffalo	18.25 to 18.75
Chicago	18.00 to 18.50
Cleveland	19.50 to 20.00
Eastern Pa.	22.00
Pittsburgh	21.00 to 21.50
St. Louis	19.50 to 20.00

SHAFTING

Boston, ship point	13.00 to 13.50
Chicago	17.35 to 17.90
Eastern Pa.	19.00 to 20.00
New York, deal	15.00 to 15.50
St. Louis	18.00 to 18.50

Iron Foundry Scrap

CAR WHEELS

Birmingham, iron	12.00 to 13.00
Boston, con.	14.00 to 14.50
Buffalo, iron	13.00 to 13.50
Buffalo, steel	17.00 to 17.50
Chicago, iron	14.00 to 14.50
Chi., rolled steel	17.75 to 18.25
Cincinnati	12.50 to 13.00
Eastern Pa., cast	16.50 to 17.00
Eastern Pa. rolled	17.00 to 17.50
N. Y., iron, deal.	12.00 to 12.50
Pittsburgh, iron	16.00 to 16.50
Pittsburgh, steel	19.50
St. Louis, iron	14.50 to 15.00
St. Louis, steel	16.25 to 16.50

No. 1 CAST SCRAP

Birmingham, cup.	14.50 to 15.50
Buffalo	15.50 to 16.00
Boston, textile	15.00 to 15.50
Chicago, mach.	17.65 to 18.20
Chicago, railroad	16.80 to 17.35
Chicago, agri.	15.70 to 16.25
Cincinnati, mach. cupalos, net deal.	16.00 to 16.50
Cleveland, cupola	16.00 to 16.50
Detroit, net	13.50 to 14.00
Eastern Pa. cupola	16.50 to 17.00
N. Y., cup., deal.	13.00 to 13.50
N. Y., del. local foundries	16.50 to 17.00
Pittsburgh, cupola	14.75 to 15.25
San Fran., del.	13.50 to 14.00
Seattle	16.00 to 16.25
St. Louis, mach.	15.00 to 15.50
St. Louis	14.00 to 14.50
Valleys	16.50 to 17.00

HEAVY CAST

Boston	10.50 to 11.00
Buffalo, breakable	12.50 to 13.00
Cleve., breakable	12.50 to 12.75
Detroit, auto., net	19.00 to 19.50
Detroit, breakable	9.00 to 9.50
Eastern Pa.	16.00
New York, deal	12.50 to 13.00
Pittsburgh	15.00 to 15.50

MALLEABLE

Boston, railroad	15.75
Buffalo	15.50 to 16.00
Chicago, agri.	13.00 to 13.50
Chicago, railroad	17.25 to 17.75
Cinn., R. R., deal	15.00 to 15.50
Cinn., agri., deal	14.00 to 14.50
Cleveland, agri.	15.00 to 15.50
Cleveland, rail.	16.00 to 16.50
Detroit, auto	14.00 to 14.50
Pittsburgh, rail	14.00 to 14.25
St. Louis, rail	15.00 to 15.50

Miscellaneous Scrap

RAILS FOR ROLLING
5 feet and over

Birmingham	13.00 to 14.00
Boston, dealers	11.00 to 11.50
Rails scrap, Boston	11.50 to 12.00
Skeleton, Boston	9.00 to 9.25
Buffalo	15.00 to 15.50
Chicago	16.50 to 17.00
Eastern Pa.	15.00 to 15.50
New York	12.00 to 12.50
Pittsburgh district	18.50 to 19.00
St. Louis	15.50 to 16.00

LOCOMOTIVE TIRES

Chicago, No. 1	15.00 to 15.50
Chicago, cut	17.50 to 18.00
St. Louis, No. 1	14.00 to 14.50

LOW PHOS. PUNCHINGS

Chicago	16.75 to 17.25
Pittsburgh	19.50

into the doldrums. Prices are showing a decidedly firm situation all around. Supplies are fairly good in practically all lines.

New York, Dec. 24.—Placing of 22,000 tons of heavy melting steel by two eastern consumers features the scrap market. Of this amount, 10,000 tons were placed by a Claymont, Del., consumer at $16, delivered, and 12,000 tons by a Coatesville, Pa., mill at a price reported between $16 and $16.50, delivered. Other consumer demand continues more or less spotty, but with the price tendency upward. Some dealers here are offering to buy rails for rolling at up to $12.50, New York; yard steel at around $9 to $9.50; and railroad steel at $11.50 to $12.50.

Philadelphia, Dec. 24.—Iron and steel scrap reflects a firm tone and dealers in some cases are paying as high as they are getting from consumers. Dealers have paid $15.50, delivered, for No. 1 heavy melting steel on sales at that figure and $13 for No. 2 steel.

Buffalo, Dec. 24.—Reports of higher markets outside and actual offers from other consumers $1 to $1.25 above previous sales here have strengthened the scrap market considerably. Dealers predict buyers of choice material will have to pay at least $16.50. There is an open offer of $15.10, Buffalo, for selected No. 1 hydraulic compressed sheets. No. 1 cast has sold at $16, although American Radiator Co. bought at $15 ten days ago. All blast furnaces are buying borings, offering $11.50. One offer of $8 is reported for machine shop turnings.

Pittsburgh, Dec. 24.—Iron and steel scrap prices continue to seek higher levels. A district mill is understood to have bought a tonnage of heavy melting steel at $19, duplicating the price on a recent sale of hydraulic compressed sheets. Heavy breakable cast has continued its sharp advance from $13 to $15 by a sale at $15.50.

Cincinnati, Dec. 24.—Scrap dealers and buyers are waiting the announcement of prices received by railroads for December offerings closed this week, and also keeping an eye on developments bearing on the market for the opening weeks of the New Year. If an estimate might be ventured the shipments in the current week have dropped about 30 per cent and will be much lower in the holiday week. Prices are unchanged. Inquiry is received daily by dealers for small lots, a number of car lots having been bought within the past few days.

St. Louis, Dec. 24.—Holiday and inventory considerations have held trading in iron and steel scrap to small proportions, but the market is strong, and a real buying movement is expected. There is a notable scarcity of scrap, and offerings are the smallest in many months. Heavy quotas which are usually disposed of here by eastern railroads with local connections are being absorbed by melters in Chicago and in the Valleys.

Detroit, Dec. 24.—Through a blanket of holiday dullness, strength is discernible in iron and steel scrap. Borings, short turnings and machine shop turnings are 25 cents higher. Inquiry for borings is expanding. Dealers generally are agreed that a strong market approaches, but differ on current levels. Some believe compressed sheets and No. 1 steel are not worth over $13. If automotive production expands in January as expected, the present scarcity in scrap will be somewhat overcome, but heavier auto production will induce greater steel production and this should absorb the increase.

Birmingham, Ala., Dec. 24.—Better sentiment is discernible in scrap, many orders being booked for heavy melting steel and other grades. Best quality of heavy melting steel commands $12.50. Prices of other items hold strong. Dealers are selling ahead cautiously.

Toronto, Ont., Dec. 24.—The iron and steel scrap market is quiet and likely to remain so until after the first of the year. Some spot buying is being done, but mostly in small tonnages for immediate needs of consumers. A few consumers have covered for first quarter needs, but it appears that the majority will continue the hand-to-mouth methods of acquiring supplies. Trading between dealers has strengthened and most dealers show readiness to pick up supplies wherever available. Prices are firm and unchanged.

Canadian Scrap

Dealers' Buying Prices

MONTREAL
Per Gross Ton

Iron axles	$22.00
Steel axles	20.00
Car wheels	16.00
Stove plate	13.00
Wrought pipe	5.00
Turnings	6.00
Heavy melting steel	7.50

TORONTO

Steel axles	14.00
Iron axles	16.00
Heavy melting steel	9.50
Turnings	7.00
No. 1 mach. cast (net)	15.00
Malleable (net)	13.00

Takes Over Old Plant

Worcester, Mass., Dec. 24.—The St. Pierre Chain Corp. has taken over the old plant of the Rogers Drop Forging Co. in this city and will start at once rehabilitating it and putting it into operation.

The Gem Crib & Cradle Co., Gardner, Mass., will soon manufacture its own springs and other hardware lines which it has been buying.

Semifinished

Mills Receive Good Specifications for January—Contracts Closed at Higher Prices

SOME makers of sheet bars, billets and slabs have received a good volume of specifications for January, especially from makers of sheets and strip. In a few instances tonnages due in fourth quarter will be carried over for delivery in first quarter, despite the advance in prices on new business for first quarter. A good many first quarter requirements have not been covered.

SEMIFINISHED STEEL PRICES, PAGE 1668

Pittsburgh, Dec. 24.—Additional contracts have been signed for first quarter sheet bars, but considerable tonnage remains to be closed. On business placed, $34, Pittsburgh, prevailed. This is an advance of $1 a ton over the fourth quarter level, and since consumers are specifying freely against existing contracts they will be supplied for a short period into January and are biding their time in making new commitments. Specifications for other semifinished material have been fairly active. Some wire rod contracts have been placed, unchanged at $42, Pittsburgh. Rerolling billets, 4 x 4-inch, and equivalent area slabs are $33, smaller sizes $1 higher.

Youngstown, O., Dec. 24.—Continued optimism in the sheet and strip trade has been reflected in the steady buying of sheet bars and billets in this district. Sufficient business now is on the books of steelmakers here to insure steady operations after the first of the year. Makers continue to maintain their attitude of shipping only to old customers. Sheet bars hold at $34, Pittsburgh and Youngstown, and billets and slabs at $33, with wire rods bringing $42, Pittsburgh and Cleveland.

Philadelphia, Dec. 24.—Several small sales of billets have been made in this market. The price is $33, base, Pittsburgh, with extras being waived occasionally.

Cleveland, Dec. 24.—Specifications for semifinished steel insure a continuation of capacity operations for the leading merchant producer here, during January. This interest expects to operate full through the first quarter. Current orders are light. Prices are steady.

W. H. Peterson, engineer, maintenance of way for the Chicago, Rock Island & Pacific railroad, has been appointed chief engineer, with headquarters in Chicago.

Bars

Consumers Active and Prices Steady, with Bookings Large—Mills Producing at High Rate

CONSUMPTION of soft steel bars continues heavy and specifications against fourth quarter contracts have given a good rolling schedule. First quarter bookings are being made steadily and prices are unchanged, with differentials being applied in full. At Chicago all lines show unusual activity in buying and use, with some departments increased largely.

BAR PRICES, PAGE 1667

Chicago Dec, 24.—Bar mills are well occupied on a run of specifications against fourth quarter contracts that has maintained momentum for the past three weeks. While spot and future sales are at a level with the average weekly sales this year, they show a drop from a week ago when the sales total was the second best this year. One producer reports specifications of bars and other finished products in the week just closed nearly 30 per cent above the average weekly rate of the year. Farm implement demand has been a leader in bar tonnage consumed, and has been a close second to automotive demand in total volume. Increased use of bars in building construction and in road and road machinery building is significant.

Bookings of soft steel bars for first quarter are being made steadily on the basis of 2.00c to 2.10c, Chicago. Lump differentials applying to small lots raise the price above 2.10c for many miscellaneous orders.

Alloy steel bar mills are operating 75 to 80 per cent. Both rail steel bar mills at Chicago Heights are operating on double turn, although production is less crowded than a few weeks ago, owing to seasonal declines in a number of manufacturing lines. Mills are still behind on shipments. Rail steel bars are firm at 1.95c, Chicago Heights, to the manufacturing trade. Bar iron is quoted 2.00c to 2.10c, Chicago, the price to railroads being 2.05c.

Pittsburgh, Dec. 24.—Bar specifications are unusually steady for this period. Although year-end influences restrict buying a good tonnage of material is moving for early consumption. Prospective business for January shipment indicates that the buying pace of the past few months will be well maintained into the new year. Some cold-bar finishers are specifying more freely. First quarter contracting is well advanced with current prices of 1.90c to 2.00c, Pittsburgh, continued.

Philadelphia, Dec. 24.—Steel bar demand is letting down with the holiday season. Consumers generally are under contract for first quarter at unchanged prices, 1.90c to 2.00c, Pittsburgh.

Sales managers of the Atlas Steel Corp., Dunkirk, N. Y., and the Ludlum Steel Co., Watervliet, N. Y., recently held joint meetings at each plant. The two companies are being merged.

Equipment Orders from Foundries Heavy

Cleveland, Dec. 24.—Foundry equipment orders in November, as reported to the Foundry Equipment Manufacturers' association, were double those of last November and easily the largest for that month since the association began compiling statistics. Shipments increased slightly in November, while unfilled orders declined several points. Following is a comparison by months:

	1925	1926	1927	1928
Jan.	104.2	168.2	180.4	182.7
Feb.	108.8	154.9	198.0	123.6
Mar.	159.3	157.3	131.1	138.6
Apr.	124.3	113.2	130.0	107.7
May	113.3	128.5	134.8	335.6
June	110.5	133.5	138.4	149.1
July	117.0	127.3	89.9	94.8
Aug.	190.0	141.2	106.4	278.0
Sept.	94.2	114.0	80.4	170.0
Oct.	149.5	140.5	98.0	185.0
Nov.	180.3	133.4	95.8	197.8
Dec.	140.1	181.0	106.8	.....

Base: Average monthly shipments for 1922-23-24.

Twenty Barges in Tow

Pittsburgh, Dec. 24.—The steamer MONONGAHELA of the Carnegie line is enroute to Pittsburgh with one of the largest tows in the history of the river. The tow consists of 20 barges and including the steamer is more than 1000 feet long. Included in the tow are eight loaded barges, four containing sulphur, two loaded with pit posts for the mines in the Monongahela valley and two with fluorspar.

Class I railroads Nov. 15 had 5234 serviceable locomotives in storage, compared with 4958 on Nov. 1.

Plates

Market Is Quieter—Eastern Product Competitive Farther West, with Cut in Differential

NEW inquiries for oil tank plates at Chicago total close to 10,000 tons, while 1700 tons was booked there for the Gulf Refining Co. The leading producer is likely to take the 35,000 to 40,000 tons of plates required for a New Jersey pipe line, bids for which recently were opened. Miscellaneous demands reflect seasonal conditions.

PLATE PRICES, PAGE 1667

Chicago, Dec. 24.—About 1700 tons of oil tank plates has been booked by a mill in this district for the Gulf Refining Co. From 8000 to 10,000 tons of oil tank plates are on inquiry, a part of which is for storage work contemplated for the Roxana Petroleum Co. Plate mill operations are above 70 per cent. Specifications came in at a good rate during the week and maintained the high level of the past three weeks. Deliveries are somewhat easier on the wider plates, but on narrower sizes shipments have been extended as much as three to four weeks. Miscellaneous buyers are contracting for first quarter on the basis of 2.00c to 2.10c, Chicago.

New York, Dec. 24.—The T. A. Gissespie Co., 7 Dey street, New York, is low bidder on the general contract for constructing the Wanaque aqueduct for the North Jersey district water commission, Newark, N. J. The lock-bar type of construction will be employed and between 35,000 and 40,000 tons of plates will be required. If the contract is awarded to the Gillespie company, the steel probably will be furnished by the Carnegie Steel Co. Plate demand shows some letdown here with the approach of holidays and inventory. Since the recent announcement by Bethlehem Steel Co. of a price range of 2.00c to 2.10c, base, Coatesville, other platemakers have settled down to this basis, which is substantially $1 a ton lower than the previous level. While a few large buyers had been buying at various differentials below the former range of 2.05c to 2.15c, base, Coatesville, the 2.05c had been the minimum on ordinary business, and this figure now has given way to 2.00c. In view of the fact that prices are somewhat lower, consumers are not disposed to contract ahead. Some talk is heard that 2.00c will be minimum with more consumers and that preferential prices will not be reduced in proportion. Large consumers are opposing this.

Pittsburgh, Dec. 24.—Plate buying for miscellaneous purposes is in good volume for late December, although

less active than a short time ago. Pittsburgh mills fail to benefit greatly by recent line pipe awards, most of which went to western mills. Contracting for first quarter is under way, with 1.90c to 2.00c, base, Pittsburgh, prevailing.

Philadelphia, Dec. 24.—Plate demand is fairly active, though showing effects of the approaching holidays. Consumption continues good and indications for first quarter are considered promising. The current market is being adjusted in accordance with the recent announcement by the Bethlehem Steel Corp. of 2.00c to 2.10c, base, Coatesville, equivalent to 2.10c to 2.20c, delivered Philadelphia. Preferential buyers are obtaining the usual differentials under this range of prices.

As a result of the reduction from $3 to $2 a ton in the differential between Pittsburgh and eastern mill prices, the eastern delivered plate prices now are lower at points further west, where consumers had been buying on a Pittsburgh basis.

CONTRACTS PLACED

Unstated tonnage for 1,500,000-gallon tank for Bristol, R. I., to Pittsburgh, Des Moines Steel Co.

CONTRACTS PENDING

250 tons, steel tank for Morin municipal water district, San Rafael, Calif. Bids received.

Beehive Coke Output Off

Estimated total production of beehive coke for the United States for the week ended Dec. 15, according to the federal bureau of mines, was 92,900 net tons, as compared with 94,900 tons for the week previous and 83,800 tons for the same week in 1927. Production to date for 1928 has been 4,188,400 net tons, as compared with 6,806,100 tons for the same period in 1927.

Production of bituminous coal for the week kept pace with previous weeks at 11,024,000 tons, bringing the year's total to 473,100,000 tons, compared to 499,848,000 tons for the same period in 1927.

Warehouse Is Moved

Announcement is made that the mill and warehouse department of Briggs & Turivas Inc., dealer in iron and steel products and iron and steel scrap, has been moved from 110 South Dearborn street, Chicago, to West 139th street and South Western avenue, Blue Island, Ill., where the company's yards and general offices are located.

Harry F. Alpirm, formerly with the Fishel Steel Co., Detroit, now is in charge of the mill and warehouse department, succeeding W. G. Weiss, resigned.

Pipe

Seamless Pipe Still Active with 23,500-Ton Order—New York Takes 10,000 Tons Cast Pipe

SEAMLESS steel tubing continues active, A. O. Smith Corp. booking a 23,000-ton order in the past week. Merchant pipe reflects year-end dullness. Lapwelded prices have been changed, effective Jan. 1, to give a 5 per cent advantage over seamless tubes. New York again features the cast pipe market, with two 5000-ton orders.

PIPE PRICES, PAGE 1668

Pittsburgh, Dec. 24.—Merchant steel pipe is experiencing the usual year-end quietness, although seamless makers report a fairly good demand. A 205-mile gas line pipe job to be built for El Paso Natural Gas Co. in New Mexico and Texas is reported to have been awarded A. O. Smith Corp. This line involves about 23,000 tons of 16-inch pipe.

New quotations on lapwelded steel and charcoal iron boiler tubes, to be in effect Jan. 1, give the former a 5 per cent price advantage over seamless tubes. Lapweld manufacturers have adopted the same weights and list prices in addition to the same carload lot base discounts as used on seamless material. An additional discount of 5 per cent is allowed on lapweld tubes, however, both on carload and less-than-carload lots. Manufacturers of seamless tubes have changed their discounts, effective Jan. 1, on less-than-carload orders from 4 points less than the carload-lot discount to the following: On less than 10,000 pounds, base discount is lowered 6 points; on 10,000 to a carload, base discount is lowered 4 points and 5 per cent allowed.

New York, Dec. 24.—Placing of more than 10,000 tons of water pipe by public utility companies features an otherwise listless cast pipe market. Principal buyers were the American Construction & Securities Co. and the Public Water Engineering Corp., each of which placed 5000 tons. A leading municipal inquiry calls for 2000 tons of 6 to 16-inch water pipe for Boston.

Chicago, Dec. 24.—A spurt in private buying of cast iron pipe is reported from the gas companies, which have been taking fair sized tonnages. No new municipal work has come out. Bids will be taken Dec. 28 on the 9000 tons of 6, 8, 12 and 16-inch pipe, 400 tons of fittings and 50 tons of offsets for Milwaukee. The 5700 tons of large-sized pipe for Detroit still is pending and action on the bids probably will be taken in a few days. Prices are holding at $45.20 to $46.20, delivered Chicago, for the larger diameters, or $37 to $38, base Birmingham.

Birmingham, Ala., Dec. 24.—While few lettings have been received recently, indications point to need for considerable cast iron pipe during the early part of 1929. Production is somewhat over 60 per cent. Pressure pipe demand eased off a few weeks ago, and soil pipe orders became more numerous. Many shops on soil pipe are active and little stock is going into warehouses.

Milwaukee, Dec. 24.—A. O. Smith Corp., has booked an order from the El Paso Natural Gas Co. for 23,000 tons of 16-inch pipe for a natural gas transmission line from Lea county, N. M., to El Paso, Tex., a distance of 205 miles.

CONTRACTS PLACED

5000 tons, water pipe for American Construction & Securities Co., New York, placed, bulk going to United States Cast Iron Pipe & Foundry Co. While it was reported that the company was figuring on 35,000 tons, this amount appears to have been overstated and for the present no further tonnage will be purchased.

5000 tons, water pipe, for Public Water Engineering Corp., New York, to an unstated southern maker.

1350 tons, 2 to 19 inch class B, improvement Lomita district No. 13, Los Angeles, to American Cast Iron Pipe Co.

326 tons, 4 to 8-inch class 250 and B, Burbank, Calif., 66 tons to Pacific States Cast Iron Pipe Co. and 260 tons to American Cast Iron Pipe Co.

292 tons, 4 and 8-inch class C, Friday Harbor, Wash., to United States Cast Iron Pipe & Foundry Co.

250 tons, 4 and 8-inch class 150, East Bay Water Co., Oakland, Calif., to Pacific States Cast Iron Pipe Co.

210 tons, 6-inch, class C pipe, Yonkers, N. Y., to Donaldson Iron Works, on a bid of $41.80, delivered; R. D. Wood & Co. were second with a bid of $42 and United States Cast Iron Pipe & Foundry Co. third and highest with a bid of $42.50.

150 tons, 6 and 8-inch class 150, Riverside, Calif., to Pacific States Cast Iron Pipe Co.

100 tons, 4 to 8-inch class 150, Patterson City Water Co., Patterson, Calif., Pacific States Cast Iron Pipe Co.

CONTRACTS PENDING

9000 tons, 6, 8, 12 and 16-inch pipe, 400 tons of fittings and 50 tons of offsets for Milwaukee; bids Dec. 28.

3135 tons, 4 to 12-inch class B, Portland, Oreg. Bids Dec. 28.

2000 tons, 6 to 16-inch water pipe, Boston; bids opened Dec. 26.

324 tons, 6-inch class B and C, San Diego, Calif. Bids opened.

Inland Earnings Large

Earnings of the Inland Steel Co., Chicago, in 1928 will be the largest for any postwar year, according to L. E. Block, chairman of the board. In a recent statement he said that

profits in the current quarter would be in excess of those of the same period last year when $1,574,853 net, or $1.18 a share on the common stock was earned. Earnings of the company in every quarter this year have been ahead of those for the corresponding period in 1927. Mr. Block stated the outlook is good for first quarter business.

Tin Plate

Orders for Early Delivery in 1929 Are Substantial

TIN PLATE PRICES, PAGE 1667

Pittsburgh, Dec. 24.—Tin plate consumers are ordering in substantial volume for early 1929 requirements. This is reflected in a further slight increase in operations in this district. Production now is close to 90 per cent. Most of the first half tonnage for next year is under contract, with the majority of users paying $5.35, base, Pittsburgh, subject to quantity differentials.

Fluorspar

Small Inquiry for Foreign Material Now Before Market

New York, Dec. 24.—Some inquiry for fluorspar for importation next spring now is in the market. No heavy demand for foreign fluorspar is expected for some time, as consumers of foreign spar generally have stocks, some sufficient to last through the winter of 1929-30. The present market on foreign spar, 85 and 5 per cent grade, may be quoted at $11 to $12 c.i.f. per gross ton, equivalent to $19.40 to $20.40, duty paid. Some importers will not quote less than $12. Importers believe the recent increase in the duty will result in some loss of business as they will not be able to ship as far West as before.

Cincinnati Tool Trade Holding Well

Cincinnati, Dec. 24.—Machine tool business has been good through last quarter, with some business coming from abroad but not in as large orders as usual. This is largely attributed to the fact that the regeneration of business over in Europe, especially in Germany, has also lifted tool and machinery making. One or two large orders have been booked in the quarter by one or two local manufacturers, who report that in some localities in Europe buyers prefer American made machinery and are very suspicious of any attempt to supply local tools and machinery in its stead.

One large machine manufacturing concern is enlarging facilities for manufacturing airplane motor machinery.

Sheets

Shipments and Operations Continue at High Rate—Makers Have Good Backlogs

SHEET shipments continue at a high rate. Some mills were unable to fill all specifications on fourth quarter contracts, and will require half of January to do so. Makers are assured a high rate of operations well into the first quarter. A large volume of orders have been booked at the advance of $2. Operations in the Pittsburgh district continue at close to capacity.

SHEET PRICES, PAGE 1667

Pittsburgh, Dec. 24.—Shipments from sheet mills on old orders are holding to a high rate, but tonnage specified against fourth quarter contracts which expired Dec. 15 will not be cleaned up until next month. These orders will provide backlogs to mills for a number of weeks, but since some of this buying was of a speculative nature in view of the $2 increase on first quarter business, some reaction may be felt next month. A good volume of new orders has been booked at the higher levels, however, and prospects are regarded bright for a continuation of steady demand. Although motor car builders in the past have shown a tendency to await the winter shows before launching heavy production schedules, earlier introduction of new models has served to alleviate this hesitancy. Sheet orders, as a result, are expected to be well maintained over the first of the year. New prices are steady on current bookings. A relatively large number of contracts have been signed at 2.85c, Pittsburgh, for sheet mill black, 3.00c for tin mill black, 2.10c for blue annealed, 3.60c for galvanized and 4.10c for full finished material. Operations have been steady at close to capacity, and the holiday observance interrupted production only on Monday and Tuesday.

Youngstown, O., Dec. 24.—Makers of common black and autobody sheets have booked such satisfactory tonnages as to assure continued good operating rates well into first quarter. Contrary to expectations, mills also have received good volumes of shipping orders with far less of the usual year-end holdups, so they also will run to the end of the year, except for the holiday interruptions. Most sheet mills will resume operations immediately after Christmas. The new Falls plant is down all week for extensive repairs and will resume in full on Tuesday night Jan. 1, with a full order book. Quotations are unchanged at 2.85c, Pittsburgh, for common black, 3.60c for galvanized, 4.10c for autobody and 2.10c for blue annealed.

Chicago, Dec 24.—Sheet mills are continuing operations at about 80 per cent for the district. Mills are closed for Christmas. Demand is well diversified and buyers have been specifying freely for first quarter shipment. Galvanized sheets are in good demand for the outdoor roofing industry. Deliveries on galvanized sheets are three to four weeks extended, similar to blue annealed. Gary and Indiana Harbor prices are reported firm at 2.95c for No. 24 black; 3.80c for No. 24 galvanized, and 2.20c for No. 10 blue annealed, with quotations $1 a ton higher for Chicago delivery.

Philadelphia, Dec. 24.—Sheet demand is fair, considering the season, but consumers generally are showing little interest in first quarter requirements. One mill still quotes 2.75c, base, Pittsburgh, for black sheets for immediate shipment. All other makers quote 2.85c. No new business is noted in galvanized sheets on which 3.60c, base, is quoted. Blue annealed sheet mills are holding for 2.10c, and are not disposed to meet competition of strip steel, offered at 2.00c. base, Pittsburgh.

St. Louis, Dec. 24.—The leading local sheet producer reports new business in the first three weeks of December larger than the entire month of November. Its order book is 100 per cent larger than in December, 1927.

More Castings Booked; Fewer Made

Washington, Dec. 24.—Bookings of commercial castings increased moderately in November, according to the department of commerce. Production, however, declined to about the same extent, as the following government comparisons show:

	BOOKINGS		PRODUCTION	
Total	†Total net tons	Railway specialties	†Total net tons	Railway specialties
1926	1,035,778	404,945	1,135,955	427,016
1927				
Nov.	62,683	27,639	58,997	19,146
11 mos.	841,756	344,991	906,394	351,296
Dec.	76,953	39,112	58,220	19,358
Total	918,698	384,103	964,603	370,654
1928				
Jan.	91,072	41,276	74,082	28,714
Feb.	90,677	41,096	87,323	37,719
March	83,285	30,992	93,521	38,448
April	83,737	32,810	85,669	32,619
May	86,414	34,995	92,948	36,599
June	71,745	22,597	91,387	30,742
July	66,667	20,483	78,324	27,501
Aug.	80,862	25,171	87,330	27,151
Sept.	82,329	35,324	75,356	25,311
Oct.	*78,082	*26,629	*87,058	*29,313
Nov.	84,304	34,526	81,913	30,739
11 mos.	899,174	345,809	934,911	344,862

†For tonnage of miscellaneous castings deduct Railway Specialties from this total.
*Revised.

Structural Shapes

Pending Projects of 35,000 and 25,000 Tons Feature New Inquiry—Chicago Letting of 18,500 Tons Heaviest of Week

LACK of activity in the structural market during the past week was expected. Fabricators are looking forward to a busy spring beginning with awards anticipated to be closed shortly after Jan. 1. Among the projects which were closed is the 18,500-ton board of trade building, Chicago. Pending work to be closed soon includes 6000 tons for a bank in Minneapolis and several railroad jobs in Philadelphia taking 10,000 tons each.

Recent revisions in eastern shape prices have had the effect of lowering quotations $1 a ton to certain eastern consumers. Plain material quotations for first quarter continue firm. Fabricated prices generally have stiffened in the past month with signs of further betterment.

STRUCTURAL SHAPE PRICES, PAGE 1667

Philadelphia, Dec. 24.—New structural shape demand reflects the approach of the holidays. Mills believe that large structural and shipbuilding programs will result in good shape demand for the first quarter. The recent reduction between Pittsburgh and eastern mill prices from $3 to $2 a ton, is resulting in eastern delivered prices being quoted to certain points toward the west where Pittsburgh delivered prices had been named previously. The effect is seen in reductions of $1 a ton to certain eastern consumers. The eastern mill range on ordinary shape business is 2.00c to 2.10c, base nearest mill, which is equivalent to 2.06c to 2.16c, delivered Philadelphia. Preferred customers are obtaining their tonnage at considerably under this range and no indications exist so far that such preferences will be eliminated. Eastern shape mills are operating between 70 and 80 per cent.

Boston, Dec. 24.—Business in structural lines continued dull through the past week. While business continues dull, local fabricators are looking forward to the turn of the year with considerable optimism, believing that pending propositions will be closed early and that the first quarter will result in a sizeable tonnage. Consequently they do not feel much concern because of the dullness of the past month. Prices continue firm.

Pittsburgh, Dec. 14.—Mills are receiving a fairly good volume of structural steel business, although buying lacks the activity of earlier weeks. Demand is represented largely by small orders, however, and the same holds true of awards of fabricated material in this district. Large jobs are lacking in current inquiry which is only fair. First quarter contracts for plain material are being signed at 1.90c to 2.00c, Pittsburgh.

Chicago, Dec. 24.—Several new building projects are reaching the active stage. It is estimated that several thousand tons will be required for a dormitory project for the McClintock campus of Northwestern university. From 4500 to 6000 tons will be required for the Northwestern Bank building at Minneapolis, bids for which will be received Jan. 3. Contract for the 18,500 tons of structural steel for the board of trade building, Chicago, has been awarded. Of the four bids for the general contract for the Rosenwald industrial museum, Jackson park, Chicago, three were under the $5,000,000 limit of expenditure. Specifications for plain structural material have been active, largely for individual jobs and building projects. Important tonnage has been placed on the books for first quarter, on the basis of 2.00c to 2.10c, by miscellaneous buyers. Quantity differentials are maintained in some instances.

New York, Dec. 24.—While structural demand is slack, prospects are for brisk buying after Jan. 1. In addition to heavy subway inquiry, approximately 25,000 tons are expected out shortly for the first section of the West Side elevated roadway.

Awards Compared

	Tons
Awards this week	38,045
Awards last week	22,561
Awards two weeks ago	18,348
Awards this week in 1927	25,215
Average weekly awards, Nov.	46,227
Average weekly awards, 1928	39,848
Total awards to date, 1927	1,827,903
Total awards to date, 1928	2,032,268

CONTRACTS PLACED

18,500 tons, board of trade building, Chicago, to American Bridge Co.

5700 tons, miscellaneous bridgework for Reading Co., to Pheonix Bridge Co.

3000 tons, apartment house at Maryland avenue and Kingshighway boulevard, St. Louis, to Mississippi Valley Structural Steel Co.

2700 tons, apartment hotel, St. Louis, to Mississippi Valley Structural Steel Co.

1700 tons, Ohio river bridge approach, for Louisville, Ky., Bridge commission, to American Bridge Co.

1200 tons, bank building, Mobile, Ala., through Smallman Construction Co., to Virginia Bridge & Iron Co.

1100 tons, bridge work for Kansas City & Grand View railroad, to Kansas City Structural Steel Co.

800 tons, memorial hospital, Orange, N. J., to Hinkle Steel Construction Co.

750 tons, extension to open hearth department of Laclede Steel Co., Madison, Ill., to Mississippi Valley Structural Steel Co.

604 tons, Rochester Base Ball Co., new International League stadium, Rochester, N. Y., to unnamed fabricator.

350 tons, wharf shed building for city of New Orleans, to Virginia Bridge & Iron Co.

300 tons, building for Edward Corning, East Eighty-eighth street, New York, to American Bridge Co.

275 tons, church, New Orleans, through George J. Glover, to Virginia Bridge & Iron Co.

250 tons, bridge from Baltimore & Ohio railroad to Bethlehem Steel Co.

200 tons, automobile sales building for Studebaker Corp., Chicago, to Wendnagel & Co.

180 tons, school gymnasium, Frederick street, San Francisco, to Dyer Bros.

150 tons, steel highway bridge, New York, to American Bridge Co.

146 tons, apartment, Golden Gate avenue and Steiner street, San Francisco, to McClintic-Marshall Co.

140 tons, dining room building for Andover academy, Andover, Mass., awarded to New England Structural Co.

CONTRACTS PENDING

35,000 tons, private toll bridge across Chesapeake bay from Baltimore to eastern shore of Maryland; bids shortly.

25,000 tons, first section of West Side elevated roadway, New York; plans expected in two weeks.

4200 tons, subway section, No. 5, Route No. 106, New York; Lyons Slattery Co. low on general contract.

2000 tons, McClesney, Ruben & Walbach building, Chicago; bids Jan. 7.

2000 tons, municipal power house, Fort Wayne, Ind.

1400 tons, highway bridges, Morris county, N. J.

1400 tons, 11-story apartment for Dwight P. Robinson, Ninetieth street and Madison avnue, New York.

1400 tons, highway bridges in Morris county, N. J.

1200 tons, Loew's theater, 175th and Broadway, New York; previously noted as involving unstated tonnage.

900 tons, 21-story apartment, 322 East Fifty-seventh street, New York; Walker T. Murphy, builder.

500 tons, addition to plant of Monarch Tractor Corp., Springfield, Ill.

400 tons, dock and warehouse, Cleveland & Buffalo Navigation Co., Buffalo; bids Dec. 24.

230 tons, Eckhart hall, University of Chicago, Chicago.

155 tons, apartment, Vallejo and Octavia streets, San Francisco. Bids being received.

Unstated tonnage, Pennsylvania railroad power plant, Philadelphia.

Unstated tonnage, hotel addition, Wilkes-Barre, Pa.

Valley Operations at 82 Per Cent

Youngstown, O., Dec. 24.—Observing the Christmas holiday, a number of important steel works in this district will suspend until Wednesday morning, although some sheet mills under pressure for deliveries will try to work

several 6-hour shifts meanwhile. Except the expected decrease in production due to these causes, the industry as a whole in the district expects to operate around 82 per cent this week.

Independents will operate 45 open hearth units out of a total of 51 available, a gain of one. Bar mill operations with the independents will be around 65 per cent and with Carnegie Steel Co. will continue at 80 per cent. Independent sheet mills have added five units to the active list, making 112 units active out of a total of 127. Strip and independent tin plate mills will resume at capacity after Wednesday, while the Steel Corporation tin mill subsidiary will continue at 80 per cent. Eleven wrought pipe units will be active out of a total of 20 welded and seamless units, a slightly decreased rate of operation. The A. M. Byers Co. wrought iron mill at Girard, O., will be idle this week.

Remodels Falcon Works

Youngstown, O., Dec. 24.—The Falcon works of the Empire Steel Corp. at Niles has been undergoing extensive remodeling, and when it resumes operations early in the new year it will begin rolling full-finished sheets in the eight mills. The January resumption will mark Falcon's activity for the first time in six months. The four-pot galvanizing plant will be retained at Falcon and the jobbing mill has been turned into another sheet unit.

It is understood that the Empire company has received some satisfactory sheet business from the Ford and Murray Body interests which will keep its mills occupied for some time ahead.

Ask Higher Pig Iron Duty

New York, Dec. 24.—Robert C. Lea, Stephen Girard building, Philadelphia, has been appointed secretary of a committee representing merchant furnaces along the seaboard from Massachusetts to Alabama, also the merchant furnaces in the Virginia, Cleveland and Buffalo districts. This committee has made application to the house ways and means committee for a hearing in January, when it will request a considerable increase in the duty on pig iron.

Builds New Sheet Mills

Birmingham, Ala., Dec. 24.—Tennessee Coal, Iron & Railroad Co. today announced plans for an additional unit at the Fairfield sheet mills which will double its rolling and galvanizing capacity. Twelve sheet mills will be built, six to be ready for operation in 1929.

Myron C. Taylor, chairman of the finance committee of the United States Steel Corp., has given $1,500,000 for a new law school for Cornell university, Ithaca, N. Y., of which he is an alumnus.

Concrete Bars

Small Lot Activity Fair with Several Good Inquiries —Prices Strong

MISCELLANEOUS small lots of concrete bars composed the bulk of activity in the past week. Year-end dullness descended upon the market and new projects were postponed until after the holidays. A few attractive jobs were brought out, an elevator and warehouse in Buffalo to take 1500 tons being one. Prices continue to evidence strength.

REINFORCING BAR PRICES, PAGE 1667

Chicago, Dec. 24.—Engineers and architects report increasing inquiries on building work requiring reinforcing bars. It is expected much of this will shape up shortly after the first of the year. About 700 tons of reinforcing bars for the Number One LaSalle street building has been closed. A fair amount of pending work under consideration before old reinforcing bar prices were withdrawn has been driven in. Chicago building permits for the week closed Dec. 15 numbered 174, as compared with 143 a year ago. Both billet and rail steel bar fabricators have withdrawn old quotations and are naming advanced prices. Billet bars are quoted at the minimum of 2.35c for 100 tons and over, while rail steel bars are 2.05c.

Pittsburgh, Dec. 24.—Reinforcing bar business received by mills generally consists in closing of old orders, new buying being restricted to small lots required for immediate needs. The market is quiet in this district both as to awards and inquiry and prospective work is slow to appear. Mills quote 2.25c, Pittsburgh, for cut lengths and 2.00c for stock lengths of billet bars.

Buffalo, Dec. 24.—Reinforcing bar inquiry is being covered slowly, steelworks having reduced their bookings considerably, to a low point as the year ends. Some good midwinter business is in prospect. The new international elevator and warehouse here will take something like 1500 tons, while there is about 800 tons of old inquiry remaining to be covered. There has been no booking of any character large enough to establish definitely first quarter mill shipment prices.

CONTRACTS PLACED

700 tons, rail steel bars, No. 1 La Salle Street building, Chicago, to unstated fabricator.
400 tons for subway section 4, route 106, New York, to National Bridge Works, through Slattery-Baino Co. Inc.
400 tons, apartment building, Chicago, to Concrete Steel Co.
400 tons, Kahn warehouse, Sixth and Greenwood, Philadelphia, to American Steel Engineering Co.
200 tons, apartment, South Hobart street, Los Angeles, to unknown company.
200 tons, telephone building, Richmond Hill, N. Y., through White Construction Co., to Concrete Steel Co.
100 tons, building for Whittaker Paper Co., Beaver avenue, Pittsburgh, to Carlem Engineering Co.

Awards Compared

	Tons
Awards this week	2,500
Awards last week	2,888
Awards two weeks ago	4,602
Awards this week in 1927	9,115
Average weekly awards, Nov.	4,532
Average weekly awards, 1928	6,311
Total awards to date, 1927	301,194
Total awards to date, 1928	321,845

100 tons, nurses' home, Chicago, to Concrete Engineering Co.

CONTRACTS PENDING

276 tons, highway work in Imperial county, Sacramento, Calif. Bids received.
200 tons. West Town State bank, 2354 West Madison street, Chicago, Mundie & Jensen, Chicago, architects.
150 tons, building for Texas Oil Co., Fifty-sixth street and South Michigan avenue, Chicago.
400 tons, high school, University City, Mo.

Plans Second Furnace on Neville Island

Pittsburgh, Dec. 24.—Addition of a second blast furnace at the new Neville Island plant of the Davison Coke & Iron Co. is planned. By-product coke capacity sufficient to take care of an extra stack in addition to the one already located there will be incorporated in the ovens now being built there, although it has not been decided definitely as to when the new blast furnace will be erected.

The Davison company took over the Neville Island stack and 200 acres of ground from the American Steel & Wire Co. a short time ago and now is engaged in construction work for the making of pig iron and cement at that location. The furnace had been idle for several years. Construction is a week ahead of schedule. According to present plans, the furnace will go in blast next spring, although the by-product ovens will not be completed until late in 1929.

This is the only merchant stack in Pittsburgh. Saving on the shipping of coal down the Monongahela river is estimated at $1 a ton over the rail rate. Gas from the by-product ovens

can be used to operate the cement plant which also will use blast furnace slag. Further saving is expected to be effected in the shipping of pig iron and cement by barge.

Ferrosilicon Rates Hold

Washington, Dec. 24.—The interstate commerce commission has suspended until July 20 the operation of certain railroads schedules which propose to cancel present proportional commodity rates on ferrosilicon, in carloads, from Ohio river crossings to certain destinations in Illinois, Iowa, and other states and to apply higher class rates in lieu thereof.

Reorganizes Business

Consolidated Steel Strapping Co., 2600 North Western avenue, Chicago, has been reorganized as the Signode Steel Strapping Co., with capitalization of 250,000 no par common shares and 100,000 shares of $30 per preferred stock.

Plans Plant Addition

New Britain, Conn., Dec. 24.—Landers, Frary & Clark, hardware and specialty manufacturers here, soon will start the construction of a plant addition to be used for the manufacture of electric ranges.

To Build Refrigerators

Lowell, Mass., Dec. 24.—The Steel Refrigerating Co. has been incorporated here and is expected to start manufacturing operations.

Iron Ore

Stocks at Furnaces and Lower Lake Docks Less Than Year Ago

IRON ORE PRICES, PAGE 1668

Cleveland, Dec. 24.—Stocks of Lake Superior iron ore at lower lake docks and furnaces were 1,391,598 tons lower on Dec. 1 than on the comparable day last year, the Lake Superior Iron Ore association reports. The total is 40,080,106 tons, compared with 41,471,704 tons. The following gives further details:

	Tons
Ore consumed in October	5,024,642
Ore consumed in November	4,897,404
Decrease in November	127,238
Ore consumed in November, 1927	3,813,637
Ore at furnaces Dec. 1, 1928	33,625,980
Ore on Lake Erie docks, Dec. 1, 1928	6,454,126
Total at furnaces and Lake Erie docks Dec. 1, 1928	40,080,106
Total, Dec. 1, 1927	41,471,704

John D. Ryan, chairman of the Anaconda Copper Mining Co., has presented Butte, Mont., with a new airport, built at a cost of $25,000.

The Seaboard Air Line may build an extension of its lines into Gadsden, Ala.

Rails, Cars

Car Activity Increases—Western Rail Orders Imminent—Track Fastenings Buying Fair

LOUISVILLE & NASHVILLE railroad has closed on 1200 gondolas, to be constructed at McKees Rocks, Pa. Chicago mills expect to close shortly on the 50,000 tons of rails which has been pending. The Santa Fe and Missouri Pacific car inquiries, leading the market at Chicago, aggregate 7731. Rail mills in the Chicago district have speeded up operations to 70 per cent.

RAILROAD TRACK PRICES, PAGE 1668

Chicago, Dec. 24.—Closing of 50,000 tons of rails for early shipment by three western roads is expected momentarily. This tonnage has been pending for about two weeks. Southern Pacific plans the expenditure of nearly $10,000,000 in Texas and Louisiana during 1929, continuing a program of relaying main line tracks with 110-pound rails. It is expected to relay 150 miles in 1929. Estimates in the rail market here are that rail purchases for the country will surpass during 1929 the average yearly purchases of 2,500,000 tons. Rail mill operations are continuing about 70 per cent and plans are being made to step up this rate in a few weeks.

Miscellaneous orders of track fastenings during the week amounted to 5000 to 6000 tons. From 10,000 to 12,000 tons are on inquiry. Mills are scheduling higher operations for track accessory departments immediately after Jan. 1.

Fresh specifications for finished steel are being received by mills in this district from car building shops on orders that have been closed. Steel producers are making plans to schedule much heavier work for car equipment building within the next few weeks. Chicago, Rock Island & Pacific is expected to close shortly on 3300 miscellaneous freight cars. Two other large car inquiries are pending in the western market. These are 4631 cars for the Atchison, Topeka & Santa Fe, 3100 for the Missouri Pacific.

Philadelphia, Dec. 24.—The Pennsylvania railroad is inquiring for large quantities of tie plates and track spikes. Bids will be opened Jan. 3.

Pittsburgh, Dec. 24.—The Louisville & Nashville railroad has ordered 1200 steel gondola cars from Pressed Steel Car Co. This order will be filled at the company's McKees Rocks, Pa., plant.

Both light rails and track fastenings are quiet. Standard-section rail mill operations are more active.

St. Louis, Dec. 24.—Missouri Pacific Lines will spend $4,650,000 for new steel rails in 1929 under provisions of contracts which have been awarded, according to L. W. Baldwin, president. The contracts call for 55,800 tons of 90 and 110-pound steel rails, which will be laid over 465 miles of track, with an average of 172 tons to the mile. The rail will be used for relying old rail on differential sections of the system, including the Texas lines, also for new double track work between St. Louis and Jefferson City and between St. Louis and Texarkana.

In addition to the rail order, contracts have also been let for the manufacture of 151,000 pairs of angle bars, 24,000 kegs of track spikes and the necessary tie plates and other track fastenings for use in connection with the laying of new steel rail.

Purchases of new track equipment were made from the Illinois Steel Co., Inland Steel Co., Colorado Fuel & Iron Co., Tennessee Coal, Iron & Railroad Co., Sheffield Steel Co., Scullin Steel Co. and Railroad Supply Co.

CAR ORDERS PLACED

Great Northern, 300 ore cars, to Standard Steel Car Co.
Louisville & Nashville, 1200 gondolas, to Pressed Steel Car Co.
Wabash railroad, 35 automobile cars, to American Car & Foundry Co.

LOCOMOTIVE ORDERS PLACED

Atchison, Topeka & Santa Fe, four locomotives, to Baldwin Locomotive Works.

CAR ORDERS PENDING

Atchison, Topeka & Santa Fe, 30 miscellaneous coaches, in addition to ten baggage, previously noted.
Chicago, Rock Island & Pacific, eight gasoline-electric rail motor cars, inquiry out. Previously noted as contemplated.
Great Northern, six gasoline electric rail motor cars.

LOCOMOTIVE ORDERS PENDING

Georgia Northern, one locomotive.
National Railways of Mexico, three locomotive tenders.

Lock Company Expands

Master Lock Co., 918-926 Juneau avenue, Milwaukee, established four and a half years ago, has announced plans for an increase of 50 per cent in production in 1929. Additional space has been taken in its building in the Pabst industrial community and new equipment is now being purchased. The present force of 175 to 200 will be increased to nearly 250.

Wire

Specifications Heavy as Higher Prices Go in Effect—Year End Is More Active Than Usual

VOLUME of buying at the year's end is larger than had been expected and interest is increasing. Higher prices applying on first quarter tonnages have had the effect of increasing specifications against current contracts. Buyers are offering less resistance to the new prices than had been anticipated. At Chicago production has declined slightly.

WIRE PRICES, PAGE 1668

Chicago, Dec. 24.—Western wire mill operations have declined a few points in the past ten days and now are about 65 per cent. The market is featured by active demand for manufacturers' wire, while jobber buying is sporadic. Little headway has been made in booking first quarter tonnage. Prices for first quarter are holding steadily at $2.70 for wire nails to large jobbers and 2.55c, Chicago or western mills, for bright plain wire.

Worcester, Mass., Dec. 24.—Interest in first quarter wire and nails is increasing, although not yet large. New price 2.75c, Worcester base, prevails for plain wire to dealers. End of the year volume has been heavier than usual. Mill stocks are not burdensome. There has been some decline in demand for insulated wire this month. Stocks in consumers' hands are not heavy and there will be little interruption of mill schedules over the holidays.

Pittsburg, Dec. 24.—Heavier specifications for plain wire and wire nails continue to be received by mills, with the $2 advance in first quarter prices over fourth quarter levels a big factor in the increase in demand. Contracts are being signed rather freely at the new levels, however, and sellers report meeting considerably less than expected opposition to the advance. New prices are $2.75, Pittsburgh, to the general trade for wire nails and 2.60c, Pittsburgh, for 6 to 9-gage bright plain wire.

Buffalo, Dec. 24.—Specifications on common wire are exceptionally good for this season, due to general partial covering of first quarter needs at current prices. A good volume of netting and cloth business is being lined up for first quarter delivery.

Cold Finished Steel

Buying by Automotive Interests Continues Steady

COLD FINISHED PRICES, PAGE 1667

Pittsburgh, Dec. 24.—Cold-finished steel demand from motor car and autotive parts interests is steady, although greater activity is indicated for early next year from tentative production schedules. Buyers generally will enter the year with only normal stocks. No hesitancy is shown in closing first quarter contracts, with the current 2.20c, Pittsburgh, price continued.

Bolts, Nuts, Rivets

First Quarter Contracting Nearly Complete and Heavy

NUT AND BOLT PRICES, PAGE 1668

Pittsburgh, Dec. 24.—First quarter contracting for bolts, nuts and rivets is nearly complete and in good volume. Specifications are lighter, in keeping with the seasonal trend, but prospective January business is regarded as favorable. Operations have been changed little from the previous 60 to 65 per cent rate. Bolts and nuts continue 60 to 70 off, with 2.90c, Pittsburgh, for large rivets.

Chicago, Dec. 24.—December specifications for bolts, nuts and rivets are holding well up to the rate of the past several years. Producers have covered most users on first quarter contracting and it is expected contracts will be made within a week. The slight tendency to hold down on orders within the past few days is due largely to seasonal influences. It is estimated specifications on fourth quarter contracts will be about 80 per cent of obligations. Operations of western producers are about 70 per cent. Prices are steady at 60 to 70 off for bolts and nuts, and structural rivets are 3.00c, Chicago, in carload lots.

Strip Steel

Specifications Seasonally Active from Many Industries

STRIP PRICES, PAGE 1668

Pittsburgh, Dec. 24.—Specifications for hot-rolled strip steel are steady and although not brisk are seasonally active. A fair volume of business is coming from automotive parts makers and motor car builders, but diversification of buyers is a feature of the current demand. Heavier releases are expected soon from the automotive industry. A good number of contracts have been placed for first quarter, with prices steady at 1.90c to 2.00c, Pittsburgh, for sizes up to 6 inches, and 1.80c to 1.90c for 6 1/16 to 24 inches. Cold-rolled material is in slightly better demand than hot strip, and contracting is fairly active at 2.85c and 2.95c, Pittsburgh.

A. O. Smith Corp. Books Large Pipe Orders

Orders for five new major pipe lines totaling 174,500 tons of pipe have been received by the A. O. Smith Corp., Milwaukee, within a few weeks. These include Texas-Empire line, Tulsa to Lockport, Ill., 636 miles of 12-inch pipe, 70,000 tons. Approximately one-fourth of the Roxana line, 100 miles of 10-inch pipe, 8500 tons. The El Paso natural gas line, Lea county, N. M., to El Paso, was just closed, involving 205 miles of 16-inch pipe, 23,000 tons. Western Public Service line, Baxter basin to Salt Lake City and Ogden, 287 miles of 14, 16 and 18-inch pipe, will require 33,000 tons. A new gas line requiring about 40,000 tons on which details will be announced later, also was booked. The first welded pipe was shipped Sept. 15, 1927. The company has introduced a number of innovations which have proved to be economical for pipe line laying.

Simplified Practice for Welded Chain

Washington, Dec. 24.—Division of simplified practice of the department of commerce has sent copies of the proposed simplified practice recommendation for welded chain to manufacturers, distributors and users of this commodity for acceptance. This recommendation was approved at a general conference of all interested elements in the industry, held under the auspices of the division on November 15. The simplified list of sizes and varieties is based on a careful survey of existing conditions and requirements in the industry. When the recommendation has been accepted by the industry as a whole, it will become effective for new production on Feb. 1, subject to annual review thereafter.

Traffic Manager Retires

Chicago, Dec. 24.—David Manson, traffic manager of the Ohio Iron & Metal Co., First National Bank building, is retiring at the end of this year. Mr. Manson, one of the best known traffic managers in the scrap industry, has been with the Ohio Iron & Metal Co. 36 years.

Carroll C. Smith Dies

Worcester, Mass., Dec. 24.—Carroll C. Smith, 42, of Shrewsbury, Mass., secretary of the Morgan Construction Co., Worcester, died Dec. 23. He was a native of Worcester and had been with the Morgan company 27 years.

Nonferrous Metals

Seasonal Dullness Grips Market Despite Fair Demand for Copper—Producers Are Well Booked Into January

Prices of the Week, Cents a Pound

	Copper—Electro delivered	Copper—Lake delivered	Copper—Casting refinery	Straits Tin New York Spot	Straits Tin New York Futures	Lead New York	Lead East St. Louis	Zinc St. Louis	98-99% Aluminum	Spot Antimony	Ingot Nickel
Dec. 19	16.00	16.10	15.75	49.50	49.37½	6.50	6.35	6.32½	23.90	9.87½	35.00
Dec. 20	16.00	16.10	15.75	49.50	49.37½	6.50	6.35	6.35	23.90	9.62½	35.00
Dec. 21	16.00	16.10	15.75	49.25	49.25	6.50	6.35	6.35	23.90	9.62½	35.00
Dec. 24	16.00	16.10	15.75	49.62½	49.50	6.50	6.35	6.35	23.90	9.75	35.00

NEW YORK, Dec. 24.—Buying of nonferrous metals was light in the past week, except for fair activity in copper. Quietness is natural at this season, and so is not bothering producers, especially as they are well booked for January in nearly all lines. Prices were remarkably steady, even tin changing little.

Shipments of metals continue extremely large. There is some seasonal let-down from the high level of October and November, but much less than in most years.

Copper—Fair domestic business was done on several days, and toward the end of the week export business also picked up. The former was largely for February-March shipment and the latter for January-February. Users in this country are well booked through January on their supplies, but have a fair amount to cover for February, and nearly all for March. Prices remain firm on the basis of 16.00c, Connecticut.

Zinc—Sales of prime western this week were light. A little business was done at shaded prices several days ago, but the market as a whole has remained at 6.35c, East St. Louis. It is estimated that galvanizers have covered about one-third of their requirements for the first quarter of the year.

Tin—Buying by consumers was light this week, and the price of Straits remained remarkably steady, about 49.50c for nearby on practically every day. Toward the end of the week there was a little shading of this price, while futures became firmer. Futures had been close to spot; with the result that spot was at a slight discount for a time. Consumption of tin in this country is unusually good for this season, but the fundamental situation for the world remains one in which production has not caught up with consumption. Business on the metal exchange was light this past week. Sentiment remains mixed. Some traders think that the recent drop in price has put the market on a firmer basis, while others believe that there is likely to be further liquidation and easing.

Lead—Sales fell off this past week, but producers are well booked for this month and next. In fact, some sales now have to be made against stock rather than against production. Prices are steady.—*Daily Metal Trade.*

Coke By-Products

Demand for All Products Is Light but Prices Hold Unchanged

New York, Dec. 24.—Because producers of fertilizer last summer made heavier long-time contracts than in 1927, spot demand for sulphate of ammonia is comparatively quiet. Export buying also is dull. Sulphate for the domestic trade is $2.30, delivered, and for export is $2.20, port, in double bags.

Demand for light oil distillates is reflecting holiday influences, but prices generally are firm, as sellers anticipate a resumption of brisk business after the turn of the year. Pure and 90 per cent benzols may be quoted at 23.00c, works, in tank lots and 28.00c in drums; toluol at 40.00c, works, in tanks and 45.00c in drums and commercial xylol and solvent naphtha at 30.00c, works, in tanks, and 35.00c in drums.

Naphthalene is in increasing demand by the drug trade for spring delivery with a result prices are strong at 5½c to 6½c, works, for both balls and flakes. Phenol is unchanged at 17.00c, works, with demand featureless.

Mill Products

Base prices cents per pound f.o.b. mill, except where otherwise specified.

SHEETS	
Yellow brass (high)	20.50
Copper, hot rolled	25.00
Lead, full sheets (cut ¼c more)	9.00
Zinc sheet (100-pound base)	$9.75
Zinc strip (100-pound base)	$8.75
Aluminum, flat sheets, up to 10 gage, 3" to 72" wide	31.30
SEAMLESS TUBE	
Yellow brass (high)	25.37½
Copper	26.37½
RODS	
Yellow brass (high, full turnings)	18.25
Naval brass	21.00
WIRE	
Copper, car lots	17.62½
Yellow brass (high)	21.00

Old Metals

Dealers' buying prices, cents per pound

HEAVY RED BRASS	
New York	10.00 to 10.25
Chicago	10.75 to 11.00
Cleveland	11.00 to 11.25
HEAVY YELLOW BRASS	
Cleveland	8.25 to 8.50
ZINC	
New York	3.50
Cleveland	3.25 to 3.50
HEAVY COPPER AND WIRE	
New York	13.00 to 13.25
Boston	12.75 to 13.00
Chicago	13.00 to 13.25
Cleveland	13.00 to 13.25
RED BRASS BORINGS	
New York	9.50 to 9.75
YELLOW BRASS TUBING	
Cleveland	7.50 to 8.00
LIGHT COPPER	
New York	11.25 to 11.50
Chicago	11.25 to 11.50
Cleveland	11.50 to 11.75
LIGHT BRASS	
Boston	6.25 to 6.50
Chicago	7.50 to 7.75
Cleveland	6.50 to 6.75
ALUMINUM	
Clippings, Cleveland	17.75 to 18.00
Borings, Cleveland	9.25 to 9.50
Cast, Cleveland	12.50 to 13.00
Cast, Boston	10.50 to 11.00

Secondary Metals

Remelt aluminum No. 12	16.50 to 17.00
Brass ingot, 85-5-5-5	14.25 to 14.50

Coke Oven By-Products

Per Gallon at Producers' Plant in Tank Lots

	Spot
Pure benzol	$0.23
90 per cent benzol	0.23
Toluol (nominal)	0.40
Solvent naphtha	0.30
Commercial xylol	0.30
Per Pound at Producers' Plants in 250-Pound Drums	
Phenol	0.17
Per Pound at Producers' Plants	
Naphthalene flakes	0.05½ to 0.06½
Naphthalene balls	0.05½ to 0.06½
Per 100 Pounds Delivered	
Sulphate of ammonia	$2.30

To Sell Motor Plant

Real and personal property, comprising the entire assets of the Valley Motor Truck Co., Elkhart, Ind., will be sold at auction, Dec. 27, under mortgages, by Michael Tauber & Co., auctioneers. It includes an automobile truck manufacturing plant, with complete equipment, land and buildings.

New Firm Organizes

Haverhill, Mass., Dec. 24.—Arthur H. DuGrenier Inc. has been organized here and soon will start the manufacture of vending machines and parts.

Warehouse

Considered on a Seasonal Basis, Demand for Products Continues High—Some Districts Look for Higher Prices

WAREHOUSE orders have subsided moderately, but only in response to seasonal factors. A $2 advance in sheets is expected at Pittsburgh. Bars lead demand at Chicago. Sheets and plates are moving well at St. Louis.

New York—Holiday influences have depressed jobbing demand here. However, trade sentiment continues good, jobbers generally regarding outlook after the first of the year as promising. Structural buying is outstanding, with one feature of late an improvement in plate demand. Prices are unchanged.

Boston—In face of general dullness in most other lines, warehouse interests are not complaining of the fairly good demand that has come to them.

Philadelphia—While jobbers have enjoyed good demand all through December, the volume has fallen off decidedly in the past few days. For this the holidays are blamed. Prices generally are unchanged but firm.

Buffalo—Warehouse sales of iron and steel held up well until after Dec. 20. The quarter just closing has exceded general expectations in sales volume with a favorable outlook for the next quarter. Prices are in a strong position as the result of steelworks higher quotations for first quarter but no changes are contemplated.

Pittsburgh—Jobbing sales are steady at a slower pace than a month ago, but still are seasonally active. A $2 advance on sheet prices is in prospect for the first of next year. Current prices generally are well observed.

St. Louis—Unevenness is reflected in reports of business by iron and steel warehousemen. Sheets and some descriptions of plates are moving in good volume. Railroad shops are specifying quite actively on this material, and there has been good buying by implement makers and a better current demand from the equipment interests. Requirements of the general manufacturing trade are seasonally smaller. Demand for mill supplies in the South has fallen off, and general call for goods for consumption in the rural areas is less active. An exception is wire fencing, which continues to move in good volume.

Chicago—Warehouse sales are holding to a higher level than was expected a few weeks ago. While the volume is below the heavy sales of November, steel sold from stock in December runs 5 to 10 per cent ahead of December, 1927. Sheet jobbing has been more active in recent weeks. Demand for bars is well sustained.

Warehouse Quotations in Cents Per Pound at Leading Market Centers

STEEL BARS

Baltimore	3.10c
Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Cleveland	3.00c
Detroit	3.00c
Ft. Worth	3.75c
Houston	3.00c
Los Angeles	3.30c
New York †††‡	3.25c
Philadelphia*	2.80c
Pittsburgh	2.90c
Portland	2.50c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.15c
St. Paul	3.25c
Tulsa	3.75c to 4.04c

IRON BARS

Baltimore	3.10c
Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Detroit	3.00c
Ft. Worth	3.75cc
New York††	2.80c to 3.24c
Philadelphia*	2.80c
St. Louis	3.15c
Tulsa	3.75c to 4.04c

REINFORCING BARS

Baltimore	3.31c
Boston	3.265c to 3.50c
Buffalo	2.75c
Cincinnati	3.15c
Cleveland	2.25c to 3.00c
Detroit	2.30c to 3.00c
Ft. Worth	3.50c
Houston	3.00c
Los Angeles cl.	2.65c
Los Angeles lcl.	3.00c
New York	2.85c to 3.25c
Philadelphia	2.85c
Pittsburgh	2.75c to 3.175c
San Francisco cl.	2.00c
San Francisco lcl.	2.25c
Seattle	3.00c
St. Louis	3.15c
Tulsa	3.75c to 4.00c
Youngstown	2.30c to 2.60c

STRUCTURAL SHAPES

Baltimore	3.10c
Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland	3.00c
Detroit	3.10c
Ft. Worth	4.00c
Houston	3.25c
Los Angeles	3.30c
New York†††‡	3.25c to 3.30c
Philadelphia*	2.70c
Pittsburgh	3.00c
Portland	2.90c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.35c
Tulsa	3.75c to 4.14c

PLATES

Baltimore	3.10c
Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland, ¼-in. and thicker	3.00c
Cleve., 3/16-in.	3.20c
Detroit	3.10c
Detroit, 3/16-in.	3.30c
Ft. Worth	4.00c
Houston	3.00c
Los Angeles	3.30c
New York‡‡	3.30c
Philadelphia*	2.70c
Phila., 3/16-in.*	2.90c
Pittsburgh	3.00c
Portland	3.00c
San Francisco	3.15c
Seattle	3.00c
St. Louis	3.25c
St. Paul	3.35c
Tulsa	3.75c to 4.14c

NO. 10 BLUE ANNEALED

Baltimore	3.45c
Boston, 3/16-in.	3.915c
Buffalo	3.50c
Chicago	3.35c
Cincinnati	3.45c
Cleveland	3.25c
Detroit	3.35c
Ft. Worth	4.50c
Houston	3.90c
Los Angeles	4.00c
New York‡‡	3.90c
Portland	3.75c
Philadelphia*†	3.15c
Pittsburgh**	3.00c to 3.10c
San Francisco	3.90c
Seattle	4.00c
St. Louis	3.45c
St. Paul	3.75c
Tulsa	4.20c to 4.54c

NO 24 BLACK SHEETS

Baltimore	3.10c to 4.00c
Boston	4.85c
Buffalo	4.20c
Chicago	3.80c
Cincinnati	3.90c
Cleveland	3.60c
Detroit	3.95c
Ft. Worth	4.70c
Los Angeles	4.90c
New York†††	3.90c to 4.00c
Philadelphia*†	4.00c
Pittsburgh‡	3.55c to 3.80c
Portland	4.90c
San Francisco	4.95c
Seattle	5.00c
St. Louis	4.10c
St. Paul	3.95c
Tulsa	4.34c

NO. 24 GALVANIZED SHEETS

Baltimore	4.10c to 4.75c
Boston	5.60c
Buffalo	4.70c to 4.85c
Chicago	4.65c
Cincinnati	4.75c
Cleveland	4.45c
Detroit	4.75c
Ft. Worth	5.50c
Houston	5.30c
Los Angeles	5.30c
New York†††	4.60c to 4.75c
Philadelphia*†	4.75c
Pittsburgh‡	4.40c to 4.55c
Portland	5.50c
San Francisco	5.40c
Seattle	5.50c
St. Louis	4.95c
St. Paul	4.90c
Tulsa	6.50c

BANDS

Baltimore	3.85c
Boston	4.015c to 5.00c
Buffalo	4.05c
Chicago	3.65c
Cincinnati	3.95c
Cleveland	3.65c
Detroit	3.65c
Ft. Worth	4.25c
Houston	3.65c
Los Angeles	4.15c
New York‡‡	4.00c
Philadelphia*	3.35c
Pittsburgh	3.60c
Portland	3.75c
San Francisco	4.10c
Seattle	4.00c
St. Paul	3.90c
Tulsa	4.50c to 4.66c

HOOPS

Baltimore	4.00c
Boston	5.50c to 6.00c
Buffalo	4.05c
Chicago	4.15c
Cincinnati	4.25c
Cleveland	3.65c
Detroit	4.15c
New York‡‡	4.50c
Philadelphia*	3.60c
Pittsburgh	4.50c
Seattle	5.00c
St. Paul	4.40c

COLD FINISHED STEEL

	Rounds, hexagons,	Flats, squares
Baltimore (c)	3.35c	3.85c
Boston	3.55c	4.05c
Buffalo	3.95c	4.45c
Chicago	3.60c	4.10c
Cincinnati	3.85c	4.35c
Cleveland	3.65c	4.15c
Detroit	3.85c	4.35c
Los Angeles (a)	4.50c	.....
New York	3.50c	4.00c
Philadelphia*	3.45c	3.95c
Pittsburgh	3.60c	4.10c
Portland (a)	4.75c	.....
San Fran. (a)	4.25c	.....
Seattle (a)	5.00c	.....
St. Paul (a)	3.85c	.....
Tulsa	4.76c	5.26c

(a) Rounds only.

COLD ROLLED STRIP

Boston, 0.100-inch, 500 pound lots	5.30c
Buffalo	5.35c
Chicago (b)	6.10c
Cincinnati	7.15c
Cleveland (b)	5.95c
Detroit	5.30c
New York	5.15c
Philadelphia (c)	5.00c

(b) Net base, straightening, cutting, boxing 1 ton or more.
(c) Plus mill, size and quantity extras.

SWEDISH IRON AND STEEL

New York duty paid

Hollow drill steel	13.00c
Iron bars, rounds	6.10c
Iron bars, flats and squares	6.50c

*Plus quantity differentials. ‡‡Minus quantity differentials. ††Domestic bars. ‡10 to 24 bundles. **25 or more sheets. *†50 or more bundles. †††Newark-Jersey City 4.00c on black and 4.70c on galvanized the more prevalent figures.

Pacific Coast

Small Lots Make Most of Trading—Year's Record Is Good—Prices Unchanged

WITH buying confined to small lots, trading on the Pacific coast comes to the end of the year with totals for the most part well above those of the preceding year. Cast iron pipe has been the most active item the past week. Sufficient business in all lines is pending to assure activity into the new year. prices have undergone no change from current levels.

San Francisco, Dec. 22.—(*By Air Mail*)—Trading in iron and steel products this week was mostly in lots involving less than 100 tons. The most active market was that for cast iron pipe, over 3000 tons being booked, and over 4000 tons being up for figures. Bids will be opened Dec. 28 for 3135 tons of cast iron pipe for Portland, Oreg. This is the largest inquiry during second half.

Pig Iron and Coke

Little of importance has occurred in foundry pig iron and coke and most sales continue to call for lots of less than 100 tons. No change in prices is noted.

Coast Pig Iron Prices

Utah basic	$25.00 to 26.00
Utah foundry	25.00 to 26.00
*German	24.25
*Indian	24.00 to 25.00

*C.i.f. duty paid.

Bars, Plates and Shapes

Concrete bar bookings this week were moderate and mostly small lots. Awards aggregated 643 tons, bringing the total for the year to 85,675 tons, compared with 59,619 tons for the corresponding period in 1927. An apartment in Los Angeles involving 200 tons was placed with an unnamed interest. Pending business exceeds 5000 tons. An award of 355 tons for a rest home in San Francisco is expected to be made next week.

Plate awards this week totaled 620 tons. So far this year 44,574 tons has been placed, compared with 63,086 tons for the same period a year ago. The only large pending project involves 250 tons for a steel tank at San Rafael, Calif., bids on which have been opened. Prices continue firm at 2.25c c.i.f. as a minimum.

Structural shape awards this week totaled 446 tons and brought the aggregate for the year to 141,374 tons as compared with 134,198 tons for the corresponding period in 1927. Only two lettings of over 100 tons were reported, the largest being booked by Dyer Bros., 180 tons for a gymnasium in San Francisco. New inquiries include 155 tons for an apartment in San Francisco. Bids have been opened on 661 tons for a bridge over the Missouri river at Helena, Mont. Plain structural material is firm at 2.35c c.i.f.

Other Finished Material

Cast iron pipe lettings this week totaled 3015 tons and brought the aggregate for the year to 78,670 tons, compared with 78,658 tons for the same period last year. Among larger contracts placed were 1350 tons for Lomita district No. 13, Los Angeles, awarded to the American Cast Iron Pipe Co., 292 tons for Friday Harbor, Wash., to the United States Cast Iron Pipe & Foundry Co., 326 tons for Burbank, Calif., to the Pacific States Cast Iron Pipe Co. and the American Cast Iron Pipe Co. and 250 tons for the East Bay Water Co., Oakland, taken by the Pacific States Cast Iron Pipe Co. Bids have been opened on 324 tons for San Diego work. Portland will open bids Dec. 28 for 3135 tons. Little of importance has taken place in the market for standard pipe and no large pipe line inquiries are up for figures at present.

Gets Electrifying Bids

New York, Dec. 24.—Bids are being received by the Delaware, Lackawanna & Western railroad on initial work in connection with its electrification program, previously noted as involving approximately $20,000,000. The initial work will cost between $10,000,000 and $12,000,000. Track, rolling stock and distributing equipment are involved. The company also may build a $4,000,000 power plant, if satisfactory arrangement is not made with the Public Service Corp. of New Jersey.

Chicago at 80 Per Cent

Chicago, Dec. 24.—Although rail mill operations have been stepped up in the past 10 days, the steelworks operating rate for the Chicago district remains at 80 per cent of ingot capacity. Twenty-four of the 36 steelworks blast furnaces in the district are active. Bar mill operations are averaging 80 to 85 per cent.

Form New Steel Firm

Scott-Weiss Steel Co. has been formed at Chicago as successor to the Scott Steel Co., 110 South Dearborn street. Wiliam G. Weiss has been elected vice president and treasurer. He formerly was manager of the mill and warehouse department of Briggs & Turivas. This brings Mr. Weiss and Charles T. Scott, President of the Company, again into association. Mr. Scott was with the Briggs & Turivas organization prior to forming the Scott Steel Co. Mr. Weiss formerly was with the Whitaker-Glessner organization and also was an ordnance inspector during the war, stationed at the plant of the Colorado Fuel & Iron Co., Pueblo, Colo., and American Sheet & Tin Plate Co., Gary, Ind.

Are Merged as General Machinery Corp.

The Niles Tool Works has merged with the Hooven Owens Rentschler Co., both of Hamilton, O., into a new company to be known as General Machinery Corp. The Niles-Bement-Pond Co., 111 Broadway, New York, which owns the common stock of the Niles Tool Works, will receive common stock in the new corporation in exchange.

G. A. Rentschler, president of the Hooven Owens company, manufacturer of presses, sugar machinery and other equipment, will be president of the new corporation. He is a brother of Fred B. Rentschler, of the Pratt & Whitney Aircraft Co., Hartford, Conn., recently merged with the Boeing Aviation & Transportation Co., and Gordon S. Rentschler, of the National City Bank of New York.

The Niles Tool Works will retain its identity as the Niles Tool Works division of the General Machinery Corp. Its product, chiefly railroad machinery, will continue to be sold through the Niles-Bement-Pond organization. The two plants involved in the recent merger are on enjoining properties and it is believed that the new step will result in numerous economies.

India Makes More Steel

Washington, Dec. 24.—India's output of steel was higher during October, according to the department of commerce. According to information supplied by Messrs. Tata Sons, Ltd., agents for the Tata Iron & Steel Co., Ltd., the production of the Jamshedpur works of the latter in October was materially increased, Trade Commissioner Charles B. Spofford Jr., Calcutta, reports to the department.

Pig iron production rose from 28,526 gross tons in September to 49,235 tons in October; the output of steel ingots gained from 18,191 tons to 40,710 tons, while the quantity of finished steel increased from 13,573 tons to 33,751 tons.

Buy Hardware Maker

Waterbury, Conn., Dec. 24.—Beardsley-Wallcott Co., manufacturer of electrical cooking appliances and heaters, has obtained control of Berbecker & Rowland, hardware manufacturers, Waterville, Conn. Operations of both plants will be consolidated at the Waterbury plant.

Structural Steel Sales For Year Improved

Charles N. Fitts of the New England Structural Co., the newly elected president of the American Institute of Steel Construction Inc., recently met with the engineering staff of the steel fabricators' organization. Among those present were the district engineers of the institute, to whose work Mr. Fitts especially addressed himself. In the course of his remarks, Mr. Fitts said:

"Structural steel sales during 1928 generally were larger than last year. The money market has somewhat deterred bonded investments during the past month, but we find that but a temporary check on building. Orders now coming out indicate that our business promises to go forward at a fair increase.

"Advancement in the art of steel fabricating alone is effecting sufficient economies to overcome the extra cost of investment money. The standard specifications adopted by the American Institute of Steel Construction have assisted greatly. Further economies in steel framed structures are yet to be made. It is possible that the steel floor will prove one. This floor is what we call the 'battleship deck,' which should materially reduce the total weight, and consequently the cost, of a building and still make it far stronger than anything we have known before."

Brazil America's Fourth Best Auto Market

Washington, Dec. 24.—Brazil each year becomes more important as a customer for American motor vehicles, according to the department of commerce. In 1927 it took fourth place in the world and second place in Latin America, being exceeded there only by Argentina. The total number of assembled cars and trucks exported to Brazil last year was 25,129, as compared with 22,589 in 1926, or an increase of over 11 per cent. In addition 4057 automobiles were assembled in Brazil from exports of parts.

According to the world census of motor vehicles as of Jan. 1, 1928, the registrations of automobiles in Brazil numbered 95,000, trucks 40,000, buses 1,000, and motorcycles 800. The percentage of American makes was 98 per cent of passenger cars, 80 per cent of trucks and 60 per cent of buses. The ratio of vehicles to population was 1 to 264, as compared with 1 to 38 in Argentina, 1 to 40 in France, and 1 to 254 in Italy.

During the past five years phenomenal growth in demand for the trucks has been developed in Brazil. Prior to 1923 there had never been a demand for over 200 trucks; in that year it reached the lowest ebb, but in 1924 it increased sharply to 1673 and has continued to expand until last year exports from the United States to this market numbered 11,061, or almost 90 per cent more than the previous year.

Aviation Company Buys Instrument Firm

New York, Dec. 24.—North American Aviation Inc., a $25,000,000 aviation investment and holding company has purchased the Sperry Gyroscope Co., Brooklyn, according to an announcement by C. M. Keys, active head of the aviation company. The Sperry Gyroscope Co. was one of the oldest and largest companies specializing in technical research and invention to promote safety in flying. The company was a pioneer in the development of gyroscopic control devices of all sorts. Elmer A. Sperry, chairman of the board of the Sperry company and recently elected president of the American Society of Mechanical Engineers, will be associated with the new organization, devoting much of his time to research and experimental work.

Mr. Keys also is president of the Curtiss Aeroplane & Motor Co. Inc., president of the Transcontinental Air Transport Inc., and chairman of the board of the Curtiss Flying Service.

New York Machine Tools Are Active

New York, Dec. 24.—Machine tool demand continued brisk until the last two or three days, when preholiday influences became pronounced. The General Electric Co. continues the most active buying interest here, having issued a number of additional inquiries for miscellaneous machine tools within the past week for Schenectady, N. Y. The Wood Newspaper Machinery Co., Plainfield, N. J., has closed on several machines, and the Erie railroad upon at least two machines within the past ten days or so. New York Central continues to bring out an occasional inquiry, but has bought little so far this month. The Landis Tool Co. is reported to have purchased some equipment for its plant in Philadelphia.

Recent orders booked by Pratt & Whitney Co. include four engine lathes, three jig borers, one vertical shaper and one centering machine, while orders of Niles Tool Works include one boring mill, one wheel press and one steam hammer. This latter company's miscellaneous department has booked orders for four radio drills, one upright drill and two grinders, all of various makes.

A 10-ton locomotive crane, used, for Hudson Valley Lumber Co., Nanuet, N. Y., has been sold by Forsythe Bros. and a rebuilt locomotive crane for operation at Springfield, Mass., has been placed, the contract reported going to Industrial-Brownhoist Corp.

Among pending cranes are: A 7½-ton handpower crane, 70-foot span, for N. P. Nelson Mfg. Co., Passaic, N. J., to Box Crane & Hoist Corp.; two overhead cranes for American-Enka Corp., Asheville, N. C., to Box Crane & Hoist Corp.; specifications call for one 20-ton, 1-motor crane, 42-foot span, and one 10-ton handpower crane, 40-foot span.

Pig Iron

(*Concluded from Page* 1669)

as melters are covered. Several orders for charcoal iron have been placed in this district. Charcoal iron furnaces are in stronger position with recent reductions in stocks. The price is $24, Lake Superior furnace. Silvery sales are light. The base foundry and malleable grades are firm at $20, Chicago furnace, and furnaces are entering the new year in a much stronger position than usual.

St. Louis, Dec. 24.—Pig iron shipments are maintained at the record levels of the past several weeks. But new orders are smaller. The melt is much heavier than usual at this time of year. Consumers generally look for good business immediately after Jan. 1. Inquiries for their products are heavy. Pig iron sales in the past week amounted to about 1800 tons. Prices are steady.

Birmingham, Ala., Dec. 24.—Pig iron order books for delivery during first quarter are well filled. Sales have been practically at a standstill for the last few days, owing to the holiday. Delivery also has eased off and will not make complete recovery until after next week. Reports are current that melt in various directions will be more active on the turn of year than for some time. Melters have no large amount of material on yards and will require active delivery. Current prices are on $16.50 per ton, base, No. 2 foundry. Two companies, however, are sounding out $17. This base may be effective Jan. 1.

Toronto, Ont., Dec. 24.—While advance buying is strongly featured in the Canadian pig iron markets, spot buying has fallen off slightly owing to the holiday season. First quarter contracts and specifications call for larger tonnages than did those of any quarter of 1928. Fifty to 60 per cent of the requirements have been covered. Prices are firm.

Landis Committee Loses in Chicago Court

Chicago, Dec. 24.—In an opinion handed down by the Illinois supreme court, the Citizens' Committee to Enforce the Landis Award is refrained from interfering with the carpenters' union and the freedom of contract between the carpenters and their employes. This ends a seven-year legal battle started by the carpenters' union opposing the Landis wage award in the Chicago building industry.

The carpenters sought damages against the citizens' committee, but in that appeal were unsuccessful. Hope Thompson, former assistant United States district attorney, who represented the labor group, stated that the damage suit was incidental. "Our main desire," he said, "was to establish the principle that large groups outside of an industry could not dictate how that industry should be run or interfere with the employment of men in that industry."

The court's opinion instructs the Cook county superior court to issue an injunction against the committee, which is restrained also from "combining and conspiring in any manner to interfere with the carpenters," from advising any person to refuse to employ members of their union, from sending men around buildings in Chicago to represent themselves as deputy sheriffs and carrying concealed weapons, and from "doing any other thing to interfere with the carpenters and their employers."

The carpenters alone remained outside when the building trades unions were parties in the negotiations that led to the Landis award. When former Judge Kenesaw M. Landis decided on the wage of $1 an hour the carpenters took no part in the arbitration, but employers later offered the carpenters this wage, which was refused. The union's petition for damages was followed by much controversy over the Landis award. The citizens' committee raised $3,000,000 to carry on this work.

Unit Corp. Buys Again

Acquisition of the Brown-Lipe Gear Co., Syracuse, N. Y., a $4,000,000 property, by the Unit Corp. of America, Milwaukee, has just been announced by W. H. Schmidt, president of the parent company, which is creating a group of manufacturers of transmission units for automobiles, trucks and tractors. The original consolidation was that of the Obenberger Forge Co. and the Dallmon Machine & Mfg. Co., both of Milwaukee. Next the Universal Power & Equipment Co. of Detroit, founded by William Ford, brother of Henry Ford, was acquired. The purchase of the Fuller & Sons Co., gear manufacturer, Kalamazoo, was made several months ago. Negotiations for other concerns in allied industries are under way, according to Mr. Schmidt.

Pig Iron Up, Ingots Off, in Canada

Toronto, Ont., Dec. 24.—Production of pig iron in Canada in November was 95,426 long tons, compared with 93,186 tons in October and 37,989 tons in November, 1927. In the 11 months ending November, cumulative production reached 934,084 tons, an increase of 43 per cent over 646,500 tons produced in the corresponding period of 1927. The current year's output included 658,514 tons of basic, 195,733 tons of foundry and 79,838 tons of malleable.

Production of ferroalloys in November amounted to 4532 tons, more than double the 2127 tons of October. For the year to date, production totaled 40,073 tons, compared with 52,161 tons during the first 11 months of 1927.

Production of steel ingots and direct steel castings at 108,463 tons was slightly under the output of 108,987 tons for October, and 34 per cent over the 80,730 tons in November, 1927. The decline in November's tonnage was due to the decrease in steel ingots, which dropped to 104,501 tons from 105,437 tons. Steel castings increased to 3962 tons from 3550 tons.

For the 11 months ending November, cumulative production of steel ingots and castings totaled 1,137,160 tons, an increase of 40 per cent over the 811,390 tons made during the corresponding period of 1927. It included 1,097,977 tons of steel ingots, and 39,183 tons of direct steel castings.

Saw Works Will Expand

Springfield, Mass., Dec. 24.—The Spartan Saw Works, this city, will build a large addition to its present plant. This is the second extension which the company has built since the war. This newest building project will increase the capacity of the plant by 50 per cent.

Officials of the Gulf States Steel Co., including W. H. Coverdale, the new president, have been inspecting the company's properties in Gadsden, Ala., recently. Between $3,500,000 and $4,000,000 may be spent on expansion next year.

Employment and Payrolls Down in November

Washington, Dec. 24.—Employment decreased 0.5 per cent in November, compared with October, and payroll totals decreased 3 per cent, according to the bureau of labor statistics.

A slight falling off in employment in November is usual, the bureau says, the peak of autumn employment being reached in October; payroll totals are likely to be considerably diminished by closings for holidays.

Employment increases were shown in November over October in the machine tool and shipbuilding industries. There were also gains in the iron and steel and nonferrous metal groups the bureau reports.

There was a decrease in employment in November of 9 per cent in the automobile industry and a falling off in the cast iron pipe industry.

In November, compared with the same month of 1927, there was an increase of employment in the iron and steel, nonferrous metal groups and also in the industries of iron and steel, foundry, machine tool, brass, automobile and agricultural implements.

Shipyard Is Sold

Recent sale of the property of the Milwaukee Dry Dock Co., Milwaukee, by the American Shipbuilding Co., to unidentified interests lends weight to reports that the Chicago & Northwestern railway has acquired the site for an extension of its Milwaukee repair shops and transfer yards. The yard originally was the Wolf & Davidson shipyard, which was noted in the early shipbuilding days on the Great Lakes as one of the most prominent construction and repair docks, before the days of steel and steam. In recent years the yard has been engaged in repairs on smaller ships. It will cease work Dec. 31, the sale being effective Jan. 1.

Will Sell Equipment

A list of woodworking machinery of the Edward Wilkinson & Co., Inc., Providence, R. I., will be sold at receiver's sale, public auction, Jan. 3. Included are molders, matchers, borers, planers, saws, drills, sanders, threading, turning lathes, blowers, 34 motors, and a miscellaneous list of other woodworking machinery.

The portland cement industry in November operated at 77.4 per cent of capacity.

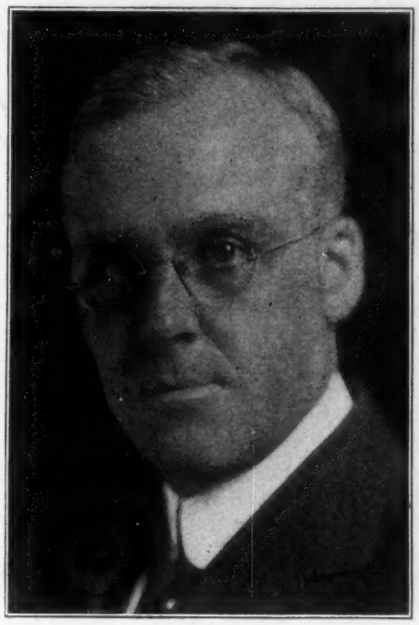
Industrial Men in the Day's News

Ernest T. Weir, Elected a Director of the American Iron and Steel Institute

HIS election as director of the institute comes as recognition of his prominence in the iron and steel industry.

FROM an humble beginning he has elevated himself to the chief executive position solely through his own efforts and ambitions.

IN ADDITION to his steel interest he is identified with many other enterprises in the Pittsburgh and Wheeling districts.



IN RECOGNITION of his prominence in the steel industry gained as president of the Weirton Steel Co., Weirton, W. Va., Ernest T. Weir has been elected a director of the American Iron and Steel institute. Beginning in a small way in the industry, Mr. Weir through ambition and concentrated effort, advanced steadily to the position of importance which is now his.

Mr. Weir was born in Pittsburgh, Aug. 1, 1875, and has spent most of his time in and about Pittsburgh, Weirton and Clarksburg, W. Va. His early education in the public grade and high schools was received in Pittsburgh, after which he embarked on his business career. At the age of 15, Mr. Weir obtained a position with the Braddock Wire Co. A year later he went with the Oliver Wire Co., in Pittsburgh, gaining much practical experience which was to prepare him for the years which followed.

He had a coveted opportunity when, in 1901, he became manager of the Monongahela Tin Plate mills of the American Tin Plate Co. Two years later he also was made manager of its Monessen mills. The executive training he received in these years was invaluable to him later.

Associated with J. R. Phillips in 1905, he organized the Phillips Sheet & Tin Plate Co. in Clarksburg, W. Va., and became its secretary and general manager. Under his guidance the company grew rapidly. Three years after its organization he was elected its president and when the name of the company was changed to the Weirton Steel Co. in 1918, Mr. Weir continued in the chief executive position.

The Weirton Steel Co. manufactures coke, pig iron, open-hearth steel, tin plate, sheet steel, and hot and cold rolled strip steel. Mr. Weir's ability has won for him an important place in the iron and steel industry.

Mr. Weir is identified with many other enterprises, and in addition to his duties as president of the steel company he is president of the Bank of Weirton in Weirton. He is also a director of the Bank of Pittsburgh; Edgewater Steel Co., Oakmont, Pa.; Hanna Ore Mining Co., Cleveland; Redstone Coal & Coke Co., Brownsville, Pa.; Weirton Improvement Co. and the Oak Hill Supply Co., located in the Monongahela valley.

Many clubs and well known organizations in Pittsburgh and other cities have his name on their roll. Among the clubs are Duquesne, Pittsburgh Field, Country and Pittsburgh Athletic association in Pittsburgh; Fort Henry of Wheeling, W. Va.; Woodmont Rod and Gun, Baltimore; Congressional at Washington, and others. Mr. Weir is a member of the Pittsburgh chamber of commerce, Engineers Society of Western Pennsylvania, and the West Virginia Manufacturers' club, in addition to the American Iron and Steel institute.

Men of the Industry

CARL F. Weigel, who prior to the combination of the Walsh & Weidner Boiler Co. and the Casey-Hedges Co., early this year was chief engineer of the former company, has been made vice president and general manager of the Hedges-Walsh-Weidner Co., Chattanooga, Tenn. This company is a subsidiary of the Combustion Corp. of America, New York, of which H. D. Savage is president.

* * *

Stanley M. Mercier, recently was appointed manager of the Boston office of the Jeffrey Mfg. Co., Columbus, O., at 141 Milk street, Boston.

* * *

Truman A. Thomas has been appointed general manager of the Universal Metal Mfg. Co., Birmingham, Ala., maker of sheet steel products.

* * *

J. L. Tildsley Jr., formerly with the American Cyanamid Co. is now identified with the tar products division of International Combustion Tar & Chemical Corp., New York.

* * *

J. H. Hillman Jr., director of Spang, Chalfant & Co. and Oil Well Supply Co., Pittsburgh, has been elected to the directorate of the Buffalo, Rochester & Pittsburgh railroad.

* * *

F. G. Bennett, Buckeye Steel Castings Co., Columbus, O., has been appointed chairman of a committee to study the accident problem in foundries by the metals section of the National Safety council.

* * *

Robert L. Cooley, director of the Milwaukee vocational school, Milwaukee, was re-elected president of the American Vocational association at its annual convention in Philadelphia, for a second term.

* * *

W. L. O'Connell, former sales representative in Detroit for the Empire Steel Corp. and now Detroit sales representative for the Hines Steel Products Co., Youngstown, O., has established offices at 104 Michigan Terminal Warehouse, Detroit.

* * *

William W. Swayze, formerly manager of the American Manganese Steel Co., New Castle, Del., plant, recently was made superintendent of the Deemer Steel Casting Co., New Castle, Del. Mr. Swayze also was affiliated with the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., prior to his employment by the American Manganese Steel Co.

* * *

Arthur F. Moul has been elected a director and secretary of Samuel C. Rogers & Co., Buffalo, maker of machine knife and saw grinders. Mr. Moul joined the Rogers organization in June, 1924, and has been manager for the past three years.

* * *

Edmund P. Burke, for several years connected with the engineering and sales organization of the Truscon Steel Co. at San Francisco and Los Angeles, has been transferred to the home office at Youngstown as an assistant to C. I. Auten, vice president.

* * *

C. E. Foust, vice president and general sales manager of the Kentucky Fire Brick Co., Chicago, has been made representative of the Birdsboro Foundry & Machine Co., Birdsboro, Pa., in the Chicago district with headquarters at 208 South LaSalle street.

* * *

Willard P. Chandler Jr., for the past two years associated with the American Heat Economy Bureau Inc., Pittsburgh, will join the furnace department of the Blaw-Knox Co., Pittsburgh. Mr. Chandler previously was connected with the Carnegie Steel Co. for 16 years in various capacities of steam combustion engineering.

* * *

W. J. Holtmeier has been appointed sales manager, grinding division, of the Hill-Curtis Co., Kalamazoo, Mich. For the past 12 years Mr. Holtmeier has been associated with the Hisey-Wolf Machine Co., Cincinnati, in various capacities, for the past three years as general sales representative and advertising manager.

* * *

Edwin F. Baley, formerly of the Morse Dry Dock Corp., Brooklyn, N. Y., has been appointed vice president and general manager of the Otis Engine Co., Brooklyn, and George T. Sinks, formerly eastern sales manager of the McMyler-Interstate Co., Bedford, O., has been made vice president and sales manager.

Carnegie Tow Large

The thirty-eighth tow of steel products from the various plants of the Carnegie Steel Co. in the Monongahela valley left Pittsburgh Dec. 19 for New Orleans. The shipment of approximately 14,000 tons consisted of steel plates, shapes and tin plate and is distributed in 15 barges. Included in the tow are three fuel barges, which make it one of the largest to leave the Pittsburgh harbor.

Obituaries

MURRAY M. DUNCAN, vice president and manager of the mine department of the Cleveland-Cliffs Iron Co., Cleveland, died Dec. 18 at his home in Ishpeming, Mich. He had been with the Cleveland-Cliffs company for 30 years and was a widely known mining engineer.

* * *

Richard A. Hale, water power engineer, died at his home in Lawrence, Mass., Dec. 17, after a brief illness.

* * *

Frank H. Page, 64, president of the National Equipment Co., manufacturer of candy-making machinery, Springfield, Mass., died last week.

* * *

Edwin B. Robinson, assistant order manager of Worcester works, American Steel & Wire Co., died last week. Mr. Robinson was a native of Albion, Me., and had been employed at the Worcester works many years.

* * *

Alois L. Rosemann, sales engineer, Vilter Mfg. Co., Milwaukee, ice and refrigeration machines and corliss engines, died Dec. 16 aged 57. He was a native of Austria and came to America in 1891. He was associated with the Vilter company for 35 years.

* * *

Charles J. Richards, president of the Richards Machinery Co., manufacturing machinist, and president and treasurer of the Badger-Packard Machinery Co., 133 West Water street, Milwaukee, died Dec. 17 of heart disease, aged 52. He was born in Manitowoc, Wis., and moved to Milwaukee in 1900, establishing the machine shop in 1906. He became interested in the Badger-Packard company in 1922.

Production of toys in the United States, of which a large proportion are metal, totals $75,000,000, according to the census bureau. German exports were $6,000,000 worth to the United States, and to Czecho-Slovakia $3,000,000 worth.

After-Holiday Outlook Bright

British Markets Appear Only Under Seasonal Cloud and Turn Early in January Is Expected—Position of Middlesbrough District Improving—Report British and American Tube Makers Agree on Price With Continent

European Headquarters,
IRON TRADE REVIEW,
Caxton House, Westminster, S. W.1

LONDON, Dec. 24.—(*By Cable*)—A thread of seasonal quietness is running through the general business situation but expansion is generally expected after the holidays. The Middlesbrough pig iron and steel position is improving and additional hematite furnaces may be started.

Conditions in the Scotch branch of the industry continue depressed. Exports of pig iron are poor and Midlands business is experiencing its usual seasonal dullness.

Structural engineers are well booked but new orders are scarce. Galvanized sheets are quiet. Tin plate business is indifferent and prices are somewhat easier.

From Paris comes the report that new business, both for the domestic and the export trade, is quiet and prices tend to be easier except in the case of domestic beams.

Brussels states that the Belgian markets are slightly depressed and prices seem to be receding.

Home demand for iron and steel is active in Germany, and export business is improving.

It is reported that Great Britain and the United States have reached a price agreement with the European tube cartel, which expires Feb. 28.

British Try New Outlets for Domestic Steel

Office of IRON TRADE REVIEW,
Prince's Chambers, Corporation St.

BIRMINGHAM, Eng., Dec. 7.—The Southern Railway Co. has this week placed an order for 70,000 steel sleepers equal to 5000 tons of steel with the United Steel Companies Ltd., to be executed at the Workington branch on the northwest coast. This announcement has been received with great interest by the British steel trade for steel sleepers in this country have never yet been tried. The advocates of steel sleepers urge that they have already proved successful on the Continent and in India. The initial cost

Sterling $4.85

is about the same as timber but it is claimed that another ten years of life would be an advantage apart from the great boon that would be conferred on the British steel trade. On Teesside it is pointed out that firms there can produce steel sleepers second to none. It is stated that experiments have been made years ago but the railway engineers have consistently adhered to the other kind. The slogan today is "Buy British" and this certainly applies in this instance, as all the timber has to be imported and the cost has been going up for some time. The basic industries of this country are naturally looking for signs such as these, and the use of steel is extending in the change from wooden railway coaches to all-steel vehicles and the replacement of timber pit props by metal.

Placing of several new orders for ships has encouraged makers of ship plates and sections as well as the finished iron makers producing chain and anchors. At this time of year market conditions naturally slacken.

His Majesty's trade commissioner in

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Dec. 24	*British* Gross Tons U. K. Ports		*French* Metric Tons Channel Ports		*Belgium and Luxemburg* Metric Tons Channel Ports		*German* Metric Tons Rotterdam or North Sea Port	
Export Prices f. o. b. Ship at Port of Dispatch—By Cable		£ s d		£ s d		£ s d		£ s d
PIG IRON								
Foundry No. 3, Silicon 2.50-3.00	$16.01	3 6 0*	$15.64	3 4 6	$15.64	3 4 6	$15.76	3 5 0
Basic	15.76	3 5 0	15.76	3 5 0	15.76	3 5 0	15.28	3 3 0
Basic-bessemer	16.98	3 10 0†	14.31	3 19 0	14.31	3 19 0	14.55	3 0 0
Hematite, Phosphorus 0.02-0.05	17.22	3 11 0	22.54	575*	.....	.....	16.98	3 10 0
SEMIFINISHED STEEL								
Billets	$30.31	6 5 0	$24.49	5 1 0	$24.49	5 1 0	$24.25	5 0 0
Wire rods	41.83	8 12 6	29.71	6 2 6	29.71	6 2 6	29.71	6 2 6
FINISHED STEEL								
Standard rails	$37.59	7 15 0	$31.53	6 10 0	$31.53	6 10 0	$31.53	6 10 0
Merchant bars	1.68c	7 15 0	1.33c	6 0 6	1.33c	6 0 6	1.38c	6 5 0
Structural shapes	1.60c	7 7 6	1.10c	5 0 0	1.10c	5 0 0	1.15c	5 5 0
Plates, ship, bridge and tank	1.76c	8 2 6	1.39c	6 6 0	1.39c	6 6 0	1.41c	6 8 0
Sheets, black, 24 gage	2.17c	10 0 0	2.24c	10 3 9	2.24c	10 3 9	2.48c	11 5 0
Sheets, galvanized, 24 gage, corrugated	2.93c	13 10 0	2.26c	10 5 0	2.26c	10 5 0	3.41c	15 10 0
Bands and strips	2.17c	10 0 0	1.38c	6 5 0	1.38c	6 5 0	1.49c	6 15 0
Plain wire, base	2.12c	9 15 0	1.71c	7 15 0	1.71c	7 15 0	1.71c	7 15 0
Galvanized wire, base	2.93c	13 10 0	2.15c	9 14 0	2.15c	9 15 0	2.15c	9 15 0
Wire nails, base	2.39c	11 0 0	1.79c	8 2 6	1.79c	8 2 6	1.76c	8 0 0
Tin plate, base box 108 pounds	$ 4.37	0 18 0	.....	.....	.....	.....	$6.79	1 8 0

*Francs

Domestic Prices at Works or Furnace—Last Reported			Francs		Francs		Marks	
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$16.01	3 6 0	$17.64	450(2)	$16.54	595	$18.60	78
Basic pig iron	15.76	3 5 0	19.01	485(1)	16.68	600	20.99	88
Furnace coke	3.15	0 13 0	5.88	150	5.14	185	5.13	21.50
Billets	30.92	6 5 0	23.12	590	25.72	925	28.86	121
Standard rails	1.79c	8 5 0	1.46c	810	1.63c	1,250	1.51c	140
Merchant bars	1.68c	7 15 0	1.33c	740	1.46c	1,075	1.52c	141
Shapes	1.71c	7 17 6	1.22c	675	1.22c	935	1.49c	138
Plates, ship, bridge and tank	1.87c	8 12 6	1.54c	855	1.46c	1,120	1.71c	158
Sheets, black, 24 gage	2.28c	10 10 0	2.92c	1,620	2.34c	1,800	2.43c	225
Sheets, galvanized 24 gage, corrugated	2.96c	13 12 6	3.69c	2,050	3.87c	2,975	3.78c	350
Plain wire	2.12c	9 15 0	1.94c	1,075	1.30c	1,600	2.48c	230
Bands and Strips	2.17c	10 0 0	1.53c	850	1.72c	1,325	1.77c	164

*Middlesbrough; †Scotch foundry iron; ‡delivered; (1) Basic-bessemer; (2) Longwy. British export furnace coke £0 14s 6d ($3.52) f. o. b. Ferromanganese £21 13s 0d ($105.00) delivered Atlantic seaboard, duty-paid. German ferromanganese £15 0s 0d ($72.90) f. o. b.

The equivalent prices in American currency are in dollars per ton for pig iron, coke, semi-finished steel and rails; finished steel is quoted in cents per pound and tin plate in dollars per box. British quotations are for basic open-hearth steel; French, Belgian, Luxemburg, and German are for basic-bessemer steel.

India and Ceylon in a report issued for 1927-1928 holds out an encouraging future for the British steel trade. As is well known Britain sends the largest amount of steel of any country into India, her share being no less than 57.2 per cent of the total imports. The increase last year of something like 280,000 tons is primarily due to the replenishment of stocks depleted by the British coal stoppage of 1926, and to the boom in demand for galvanized sheets which represented last year 43 per cent of the total United Kingdom shipments of steel. The advantage accruing from the lower rate of import duty on British standard steel is considerable and in many cases insures the placing of orders for bridge work and structural sections with British works instead of on the Continent. The commissioner points out that British engineering industries are bound to benefit from the large schemes of railway construction, harbor development, irrigation and hydroelectric enterprises and bridge building.

A seasonal dullness is noticeable in all districts. The Birmingham market was chiefly engaged in discussing the tangle of railway rate reductions and this is also made an excuse for postponing business. Pig iron prices are inclined to weakness, owing to lack of specifications, Derbyshire makers being inclined to accept £2 19s ($14.29) and Northampton as low as £2 15s 6d ($13.45). The East coast hematite trade feels the effect of better conditions on the northwest coast. Middlesbrough makers are endeavoring to obtain £3 11s ($17.21) for mixed numbers but no business has been heard of at this figure, and £2 19s ($14.29) would probably be the basis at which the buyer was disposed to arrange contracts.

Only three furnaces now are producing in the Middlesbrough district and these are ample to cover requirements. In the northwestern area the hematite trade is not so active, although output has been fully absorbed. Home buying has been on a fairly extensive scale and makers are not disposed to shade prices on orders booked for forward delivery as they have a feeling that values will advance as the position becomes consolidated. Three furnaces in Scotland owned by William Baird & Co. have been blown out and the number now in blast in the west of Scotland is only 20. Reports from that area indicate that demand is at a low point and sales at current prices are not only unprofitable but involve producers generally in a loss.

Constructional engineers are taking fair quantities of steel, but new booking is slow. For the schemes now in hand engineers are anxious to cover themselves for steel, owing to uncertainty as to safeguarding proposals. The Barrow rail mill remains idle, although there is considerable activity in other steel departments, notably hoop works. Rail, fishplate and sleeper mills are employed at Workington on overseas orders.

British billet makers have not been able to maintain £6 7s 6d ($30.91), and it is quite easy to buy at £6 5s ($30.31). The end of the lockout in Germany has relieved the tension and quotations have come through from Belgian firms offering billets at £5 18s ($28.60), delivered Birmingham, and Belgian No. 3 iron at £7 2s 6d ($34.55). Birmingham merchants, however, are not meeting demand for foreign steel and some of them have had to go out of business.

The tin plate trade is featureless and prices are unchanged at 18s ($4.37) per base box. Production costs have been going up and tin plate makers are not disposed to book forward business on this basis, especially where they have good order books for the first few weeks of January. Tin plate bars continue firm at £6 ($29.10) per ton. The export trade is far from satisfactory, although Australia has been in the market for a few thousand boxes and the Far East is inquiring. Taking into account the compulsory stop weeks, output is keeping up well around 70 per cent.

French Steel Production at Highest Mark

Paris, Dec. 6.—(*European Staff Service*)—Output of steel ingots and castings in France during October was the largest tonnage ever attained in the industrial history of the country. The output in October included 818,000 tons of ingots and 16,000 tons of castings. From the point of view of method of production, there were 580,000 tons of basic bessemer, 238,000 tons of open-hearth, 9500 tons of electric, 5000 tons of acid bessemer and 1500 tons of crucible steel.

The October output of pig iron was composed of 680,000 tons of basic bessemer, 97,000 tons of phosphorus foundry, 6000 tons of phosphorus gray forge, 41,000 tons of hematite foundry, 21,000 tons of hematite forge and bessemer pig iron, and 12,000 tons of ferroalloys. The following table gives figures:

Mon. ave.	Act. fur. on last day	Pig iron	Steel ingots and castings
1913*	131	433,940	390,580
1925	148	707,840	620,540
1926	155	785,965	702,500
1927	142	774,785	689,610
1928			
Jan.	144	809,000	753,000
Feb.	149	785,000	738,000
Mar.	149	858,000	804,000
April	150	834,000	738,000
May	150	871,000	794,000
June	148	844,000	797,000
July	148	836,000	757,000
Aug.	150	857,000	793,000
Sept.	149	821,000	759,000
Oct.	150	857,000	834,000

*In pre-war boundaries.

French Steel Buying Has Filled Mill Books

PARIS, Dec. 7.—(*European Staff Service*)—The outlook of the French iron and steel market continues satisfactory. There are, however, some fluctuations in volume of inquiries, but this had been expected in view of the considerable tonnage of orders placed during the past months, particularly in September and October, when some orders were speculative. Many jobbers believed that prices would considerably increase in view of the new building scheme put forward by the Loucheur bill, and in anticipation of such an increase they bought freely. However, the effect of the bill is being felt more slowly than had been expected, and consequently demand is receding.

The Ruhr lockout has had little influence on the French market, with the exception of a few works better placed to sell in Germany. Activity of export markets has substantially receded. Some uneasiness is felt owing to contemplated activities of the American steel export association, while tin plate makers also are computing the effects of the reported understanding between American and British manufacturers. While these new factors may be exerting an unfavorable influence on the French market, the consequence will be to stimulate the formation of additional selling organizations. The general situation, however, is satisfactory, and prices now obtained for all classes of products are remunerative. It is reported that negotiations for the renewal of the O.S.P.M., controlling sales of phosphorus pig iron, have been successfully concluded, and that the entente will be renewed for two years. It is further stated that the Franco-Belgo-Luxemburg entente which fixes the export prices of pig iron also is renewed.

Franc—3.91c

It has been noted with interest in France that October production of steel was 834,000 metric tons, against 757,000 tons in September. The October output was the highest tonnage ever attained by the French steel industry. The average monthly output in 1927 was 689,000 metric tons, and in 1926 it was 703,000 tons.

Deliveries for merchant steel bars now are extended four to seven months in the east and five to six months in the north, and certain mills have completely withdrawn from the market. Prices now quoted for this class of material are for orders taken when they fit rolling schedule. The present price of merchant bars is 740 to 760 francs ($29 to $29.60) f.o.b. eastern works. The sheet market has improved, especially as regards the finer sizes, and deliveries extend from four to five months; the base price for light gages is 1120 francs ($43.70) in the east and 1150 francs ($45) in the north. Quotations for plates range from 790 to 810 francs ($30.90 to $31.60); medium sizes range from 865 to 875 francs ($33.80 to $34.30).

Here and There in Industry

Timely Information Which Records Developments in Various Lines of Productive Enterprise

ST. LOUIS STRUCTURAL STEEL CO., St. Louis, plans an expansion campaign with the view of bidding for government contracts for additional floating equipment for the Federal Barge line. The company has an assembly plant on the east bank of the Mississippi river, and though most of its work has been on small barges, it recently turned out one of 600 tons capacity for Burlington, Iowa, to be used as a floating dock. The company's present plans provide for expanding its assembly plant to build 2000-ton barges.

* * *

AGATE FOUNDRIES INC., 1721 Maypole avenue, Chicago, has been reorganized. D. H. Brownlee has sold his interest to the new officers, P. Wachtel, president; J. Meshan, treasurer and F. Wachtel, secretary.

* * *

DOMINION BRIDGE CO. LTD., Montreal, has acquired control of the Riverside Iron Works, Calgary, Alta., and plans to construct an addition. The company has also acquired 13 acres on which to establish a plant for steel fabrication.

* * *

TITAN ORNAMENTAL IRON WORKS INC., 2237 West Thirty-fifth street, Chicago, has recently organized under an incorporated form. Fred N. Karabin is president, Harvey C. Giradous treasurer and E. G. Karabin vice president.

* * *

ROOS FOUNDRIES INC., 1749 Ballou street, Chicago, has been reorganized. J. P. Hansen is president, treasurer and general manager, P. C. Peterson is vice president and G. R. Bloom is secretary. The company manufactures gray iron castings.

* * *

META-MOLD ALUMINUM CO., Milwaukee, has moved from 129 East Michigan avenue to its new plant at Fifty-seventh avenue and Burnham street, where larger facilities will be available. The company specializes in aluminum castings.

* * *

HUNTER SAW & MACHINE CO., Pittsburgh, has appointed Moyer, White & Co., 2644 Lenox avenue, Detroit, its agents in Detroit territory. James A. Lenfesty, North Charles and Thirty-fourth streets, Baltimore, has been made agent for Baltimore and Washington territory.

* * *

WEST PARK FOUNDRY CO., Cleveland, will discountine business. A meeting was held Dec. 14 to decide upon plans of liquidation.

* * *

CANADIAN WESTINGHOUSE CO., Hamilton, Ont., has taken the contract for the generator for the tenth and final unit for the Queenstown-Chippewa canal. The new unit will require extension of the powerhouse, enlargement of the fore bay, and extensive excavation on the cliff face above the powerhouse.

* * *

SQUARE D CO., Detroit, has practically completed negotiations for the purchase of the Industrial Controller Co., Milwaukee, manufacturer of pressure switches and electrical controls. Directors of both companies have approved the plan and stockholders will vote on the proposal shortly. The Square D Co. manufactures electrical devices.

* * *

MOTH AIRPLANE CORP., has decided to locate its manufacturing operations in Lowell, Mass. It has already taken over the buildings at the Lowell airport and will soon establish a factory for the building of planes. Present plans call for a production of one plane a day. Machinery for the production of parts is now being installed.

* * *

REPUBLIC BRASS CORP. has been organized to acquire the assets of the Taunton-New Bedford Copper Co., Rome Brass & Copper Co., Dallas Brass & Copper Co., Michigan Copper & Brass Co., Higgins Brass & Mfg. Co., Baltimore Copper Mills Division of General Cable Corp. Each constituent company will continue to operate as a division of the Republic Brass Corp. with personnel and management unchanged.

* * *

CAPITOL STEEL CORP., New York, recently incorporated, will deal in steel products, principally for building purposes in connection with concrete construction and building trim. Samuel Zwerin is president. He formerly was connected with the Truscon Steel Co. and the Capitol Steel Corp. of Michigan. The latter will be affiliated with the New York corporation. Louis B. Seidman, 274 Madison avenue, New York, is representative of the company in New York.

* * *

PETER SMITH HEATER & MFG. CO., operating plants on Hamilton avenue, Detroit, and in Fordson, Mich., shows an increase of 62 per cent in its pressed steel business booked in the year ended Dec. 1 over the year ended Dec. 1, 1927. October and November orders increased 40 per cent over the comparable months of 1927. Prospective heater business from the railroads is said to be good.

* * *

VERSARE CORP., Albany, N. Y., and the Cincinnati Car Co., Cincinnati, are to be merged under the name of the Cincinnati Car Corp., with headquarters at Cincinnati. Offices and engineering facilities of the Albany company will be removed to Cincinnati but the plant will remain at Albany. The company will manufacture vehicles for transportation of passengers and freight in urban and interurban movement.

* * *

DUFF MFG. CO., Pittsburgh, manufacturer of industrial and railroad jacks and drop forgings, has acquired the business and assets of A. O. Norton Inc. and all the capital stock of A. O. Norton Ltd. The name has been changed to the Duff-Norton Mfg. Co. A. O. Norton Inc., maker of railroad jacks, has a plant in Moline, Ill., and the Canadian company, one in the province of Quebec. Management of the Duff company will be unchanged. Directors are: President, T. A. McGinley; vice presidents, A. L. Humphrey and E. M. Webb; and secretary, F. O. Graham. Mr. Humphrey also is president of the Westinghouse Air Brake Co.

* * *

RUST ENGINEERING Co., Pittsburgh, has received a contract from the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., for construction of a triple fired recuperative continuous furnace, to be built at the latter's Ensley works. The furnace will have a capacity of 30 tons per hour of blooms or beam blanks. The "triple firing" refers to the three sets of burners, two of which control

the capacity of the furnace and furnish the fuel for the main combustion chamber, firing both above and underneath the blooms to be heated, while the third set of burners control the temperature of the soaking chamber, through which the blooms pass immediately before being discharged.

* * *

CENTRAL PATTERN & FOUNDRY CO., 3737 South Sacramento avenue, Chicago, has completed an addition to its foundry plant.

* * *

MERIT METAL SPECIALTIES CO., 4608 West Twentieth street, Chicago, recently incorporated, has established its plant and has installed automatic screw machine equipment and other machinery.

* * *

ACME MACHINE TOOL CO., Indianapolis, expects to have its new plant completed by Jan. 1 and production started. Jigs, tools and dies will be manufactured. C. F. Biles is proprietor.

* * *

MURRAY CORP. OF AMERICA, manufacturer of automobile bodies, will establish a plant at Memphis, Tenn., on a 45-acre tract. Plans are being made by Albert Kahn Inc., Detroit, for the first unit, 575 x 640 feet.

* * *

GOLDEN RULE CUTLERY CO., Chicago, has moved from 212 North Sheldon street to 2222 West Monroe street. R. G. Eddy is general manager. The company manufactures novelty and advertising knives.

* * *

DECATUR MACHINE WORKS, Decatur, Ill., has moved into its new plant at 430 North street. The company manufactures dies, patterns and does general machinery repairs. The new plant is of brick, 30 x 60 feet. C. H. Yochum is owner of the business.

* * *

J. TOUREK MFG. CO., Chicago, manufacturer of ball joints and screw machine products, has moved from 2100 Marshall boulevard to its new plant at 4616 West Twentieth street. J. J. Tourek is president, W. O. Olson secretary and B. A. Roloff sales manager and purchasing agent.

* * *

WAYNE PUMP Co., Fort Wayne, Ind., has completed acquisition of the business of the Fry Equipment Corp. through the issuance of 25,930 shares of convertible preferred stock and 18,000 shares of common. C. Shields, of Shields & Co., G. Wolf, of Chicago and J. Bruce, vice president of the National Park bank of New York have been added to the board of the Wayne company.

* * *

WEIRTON STEEL CO., Weirton, W. Va., has contracted with the Rust Engineering Co., Pittsburgh, for a normalizing furnace. This furnace will employ removable bung sections over its entire length to provide easy access to the alloy rolls. The furnace will be 84 inches wide inside and 222 feet long. It will have a capacity of 200 tons of normalizing sheets daily, using coke oven gas for fuel. The Duraloy Co., Pittsburgh, will furnish the alloy disks and shafts.

* * *

RHODE ISLAND MALLEABLE IRON WORKS, Hillsgrove, R. I., has bought the capital stock of the Rhode Island Fittings Co., Providence, R. I. The malleable company has operated a jobbing shop on general castings and has specialized for many years on castings for pipe unions. The fittings company will be operated as a separate unit and officers will be substantially the same as of the purchasing company. Charles Brown is president, C. P. Clough vice president, H. L. Steeves treasurer and general manager, and F. E. Grinnell secretary.

* * *

COES WRENCH CO., Worcester, Mass., has sold its wrench division to the Bemis & Call Hardware & Tool Co., Springfield, Mass., also maker of wrenches. The plant will be moved to Springfield. The machine knife business of Loring Coes & Co., at Worcester, will be continued without change. The Coes Wrench Co. was established in 1840 by Loring Coes, who invented the screw wrench commonly known as the monkey wrench. Frank L. Coes, a grandson of the founder, has been president and treasurer of the wrench company and of Loring Coes & Co.

Give Tariff Probe Rules

For its forthcoming tariff hearings, the house ways and means committee at Washington will subdivide into small committees. It is hoped that the various trades and industries will consolidate and present their views as a body. Under a new rule, applicants for a hearing will not have their names and purposes disclosed in advance. Costs of production here and abroad, trade tendencies, prices, marketing factors and transportation charges are important items in assembling a case, say Ernst & Ernst, New York.

Auto Production Doubles Last November

Washington, Dec. 24.—Automobile production declined sharply in November to 256,963 for the United States and 11,769 for Canada, yet it practically was double that of last November. For the first 11 months of 1928 output in the United States stands at 4,124,225 units; the yearly record of 1926, which it is expected 1928 will beat, is 4,298,785 units. Following are department of commerce monthly comparisons:

	United States			†Canada
1927	Total	Passenger cars	Trucks	Total
November	134,370	109,758	24,612	6,617
Total, 11 mos.	3,267,755	2,840,518	427,237	175,321
December	133,571	106,083	27,488	3,106
Total, year	3,401,326	2,946,601	454,725	*178,427
1928				
January	231,728	205,646	26,082	8,463
February	323,796	291,151	32,645	12,504
March	413,327	371,821	41,506	17,469
April	410,104	364,877	45,227	24,211
May	425,783	375,863	49,920	33,942
June	396,796	356,622	40,174	28,399
July	392,076	338,792	53,284	25,226
August	461,298	400,593	60,705	31,245
September	*415,285	358,872	*56,413	21,193
October	*397,096	*339,976	*57,120	18,536
November	256,936	217,256	39,680	11,769
Total 11 mos.	4,124,225	3,621,469	502,756	232,957

†Reported by dominion bureau of statistics.
*Revised.

Structural Orders Gain in November

Washington, Dec. 24.—Bookings of fabricated structural steel in November increased slightly over October while shipments sustained a marked decline, the following comparisons by the department of commerce reveal:

	New Orders			Shipments
1927	Actually reported tonnage	Per cent of capacity	Computed tonnage	Computed tonnage
November	193,859	63	236,250	247,500
Total, 11 mos.	.....	68	2,805,000	2,655,000
December	215,724	70	262,500	240,000
Total, 1927	.....	68	3,067,500	2,895,000
1928				
January	172,284	56	210,000	210,000
February	216,284	71	266,250	236,250
March	210,745	69	258,750	232,500
April	193,011	63	236,250	243,750
May	251,843	83	311,250	262,500
June	*245,077	*80	*300,000	262,500
July	*243,205	*80	*300,000	273,750
August	*289,156	95	356,250	292,500
September	*258,391	85	318,750	277,500
October	*192,854	64	240,000	322,500
November	187,331	65	243,750	288,750
Total 11 mos.	.....	74	3,041,250	2,902,500

*Revised.

Strips Are Bars, for Duty

Washington, Dec. 24.—E. W. Camp, commissioner of customs, has notified the collector of customs at New York to follow the ruling of the United States customs court in connection

with the classification of steel in strips.

In certain decisions the court held that steel strips of certain dimensions described in paragraph 316 of the tariff act are subject to classification under paragraph 304 as steel bars.

Iron, Steel Price Index Gains in November

Washington, Dec. 24.—November wholesale price index number for metals and metal products was 101.7, compared with 101 in October and 97 in November of last year, taking 1926 as 100, according to the department of commerce.

Iron and steel wholesale price index for November was 96.1, compared with 95.1 for October and 93.5 for November, 1927, while the same index for nonferrous metals for November was 97.9, compared with 95.8 for October and 90.3 for last November.

Wholesale price index for "other metal products" for November was 96.9, compared with 96.9 for October and 100.7 for November of last year.

November wholesale price index number for structural steel was 97, compared with 94.5 for October and 89.4 for November, 1927.

Stoker Sales Increase

Washington, Dec. 24.—Mechanical stoker sales in November, as reported to the department of commerce by the ten leading manufacturers, increased slightly over October and showed a wide margin over last November. Following are monthly comparisons:

	Stokers sold	Fire tube boilers	Water tube boilers
1926 total	1.361	289	1,072
1927			
November	67	26	41
Total (11 mos.)	1,291	450	841
December	83	29	54
Total (year)	1,374	479	895
1928			
January	75	20	55
February	85	26	59
March	123	31	92
April	88	21	67
May	130	43	87
June	162	78	84
July	186	67	119
August	162	57	105
September	161	68	93
October	100	48	52
November	116	54	62
Total (11 mos.)	1,388	513	875

To Build Model Plant

The Ford Motor Co. plans a manufacturing plant and model industrial village at South Sudbury, Mass., to manufacture small motor car parts at a point on the Central Massachusetts railroad about a mile and a quarter east of Mr. Ford's Wayside Inn.

Radiator-Sanitary Mfg. Merger Brings "Largest" Iron Melter

SUCCESS of merger negotiations between the American Radiator Co., New York, and the Standard Sanitary Mfg. Co., Pittsburgh, combines probably the largest pig iron consuming capacity in the country. The various plants of both companies have a total annual requirement of 300,000 to 350,000 tons of pig iron, with only the small stack at Buffalo, which supplies local needs only, to meet this demand from within.

The combined outstanding capital issues of these two concerns aggregate in excess of $67,000,000 in common and preferred stocks, with $10,000,000 in bonds also outstanding.

Both companies have plants and warehouses in the United States and Canada. The American Radiator Co. manufactures and sells boilers, radiators and heating apparatus, while the Standard Sanitary Mfg. Co. manufactures plumbers' supplies.

The American Radiator Co. was incorporated Feb. 10, 1899, in New Jersey, successor to an Illinois company formed Dec. 9, 1891, and at once it bought the St. Louis Radiator Mfg. Co., St. Louis; Standard Radiator Co., Buffalo; and the radiator department of the Titusville Iron Co., Titusville, Pa. It also is the holding company for the American Blower Corp. with plants at Detroit and Cincinnati, the American Radiator Co. of Michigan, Terminal Warehouse Co. of New York, Detroit Lubricator Co. of Detroit, Dominion Radiator & Boiler Co. of Ontario with plants at Brantford and Toronto, Ont., the Fox Furnace Co. of Elyria, O., Heating & Plumbing Finance Corp. of New York, the Humphreys Coal & Coke Co. of Westmorland county, Pa., with 513 acres of Connellsville coal lands and 145 beehive coke ovens; the Kewanee Boiler Co. with plant at Kewanee, Ill., and the Tonawanda Iron Co., with one blast furnace at Buffalo, which furnishes a part of its pig iron requirements for its nine local plants in the Buffalo district.

The American Radiator Co. besides owning and operating the nine plants at Buffalo, also has two at Detroit and one each in these cities: Bayonne, N. J., Titusville, Pa., Bremen, Ill., Springfield, O., Kansas City, Mo., Birmingham, Ala., Litchfield, Ill., and St. Paul. It also has warehouses and sales offices in the principal cities. While its general executive offices are in New York, its general sales and manufacturing executive offices are in Buffalo, and its western sales offices have headquarters at Chicago.

The Standard Sanitary Mfg. Co. was incorporated Dec. 26, 1899, to take over and consolidate various plants manufacturing plumbers' supplies. Since Jan. 1, 1917, it has taken over the Ahrens & Ott Mfg. Co., Louisville, Ky.; the Standard Mfg. Co. and the Standard Pipe Supply Co. of Pennsylvania, the Standard Sanitary Mfg. Co. of Maine; also, the Hedges-Atkins Supply Co. of Denver and the Pacific Sanitary Mfg. Co. of San Francisco. It is the parent company of the Standard Sanitary Mfg. Co. of Canada, with capital of $1,000,000 and with a plant in Toronto, Ont.

The Standard Sanitary Mfg. Co. itself has plants at Louisville, Ky.; Pittsburgh and New Brighton, Pa.; Kokomo, Ind., Tiffin, O., Baltimore and San Francisco, together with a large number of warehouses. Its general offices are in the Bessemer building, Pittsburgh, which also is its general executive headquarters.

The American Radiator Co. has outstanding $3,000,000 in 7 per cent cumulative preferred stock (par $100) on which it paid last year $480,735 in dividends; and $33,065,500 in common stock (par $25) on which it paid last year dividends of $6,312,879. It has outstanding $10,000,000 in 20-year 4½ per cent gold debentures maturing May 1, 1947.

The Standard Sanitary Mfg. Co. has outstanding $4,786,400 in 7 per cent non-cumulative preferred stock (par $100) on which last year it paid dividends of $333,298; and now has out 3,234,486 shares of no par common stock on which common stock before conversion last spring was paid out in dividends a total of $5,390,809. Last spring the Standard company, which then had common stock (par $25) outstanding to the amount of $26,954,050, offered to exchange this for no par stock at the rate of three shares of no par stock for one of the $25 par common.

Frick Co. Closes Mine

Uniontown, Pa., Dec. 24.—The H. C. Frick Coke Co. has closed its Palmer coal mine, one of its largest, near here. The resulting reduction in production is being distributed among other mines of the company.

Henry Lindahl Machine Co., Chicago, has moved from Lake and Morgan streets to 5900 Ogden avenue.

Dividend Ratio to Income Heavy in 1926

Corporations in the United States in 1926 in the aggregate paid out a greater proportion of their total receipts in cash dividends than in either 1925 or 1923, the two preceding "good" years, but manufacturing companies did so in spite of the fact that they were operating on perceptibly narrower profit margins on sales, according to an analysis of income returns made by the National Industrial Conference board, New York.

Manufacturing corporations in the aggregate distributed 4.1 per cent of their gross income as cash dividends in 1926, which compares with 3.6 per cent in 1925 and 1923 and 3.5 per cent in 1924. But although both 1926 and 1925 were considered as "banner" years for industrial activity, less of the consumer's dollar went into manufacturing profit in 1926 than in 1925, and much less did in 1925 than in 1928.

The fact that manufacturing companies could pay greater dividends in 1926 than in 1925 or 1923 in spite of the narrower profit margins, in the light of the conference board study, was due to greater volume of business. The average rate of profit to sales decreased, in spite of the progressive increase of manufacturing operations in the three good years 1923, 1925 and 1926 and the opportunity to achieve lower unit costs because of the greater production and a fairly stable or declining price level.

Locomotives in need of repair on the Class I railroads of this country Nov. 15 totaled 8789 or 14.9 per cent of the number on line, according to reports filed by the carriers with the car service division of the American Railway association. This was an increase of 612 compared with the number in need of repair Nov. 1, when there were 8177 or 13.9 per cent.

Sees Freight Rates, By-Product Coke Use Hampering Youngstown

Washington, Dec. 24.—In refusing the Pittsburgh, Lisbon & Western railroad permission to construct a railroad giving the Youngstown, O., district an outlet to the Ohio river the interstate commerce commission has cited some disadvantages under which Youngstown district producers operate and compares pig iron production costs at Pittsburgh and Youngstown:

This district is one of the most important steel-producing localities in the United States and until recently was second only to the Pittsburgh district in that respect, but, according to the record, has now been displaced in rank by the Chicago district. It is said that when the steel industries were established at that point it was a very advantageous location, being midway between the lower lake ports through which the supplies of iron ore were received, and the bituminous coal districts of Pennsylvania which supplied the fuel for manufacture.

Formerly, rate schedules on raw material and on outbound products enabled the Youngstown industries to compete successfully with their principal competitors in the Pittsburgh district and at Cleveland. During the past ten years, however, changes in these rate adjustments, and, apparently to a still greater extent, changes in the methods of the manufacture of coke, a commodity largely used in the manufacture of steel, have impaired the ability of the Youngstown manufacturers to market their products in competition with their rivals.

Another important advantage of the Pittsburgh manufacturers, developed in recent years, is their ability to utilize the improved water transportation facilities on the Monongahela and Ohio rivers for the transportation of coal from mine to mill, as well as for the movement of their products in reaching territory to the south and southwest.

Formerly the coke used in the manufacture of pig iron was produced in the coal districts by the so-called beehive process and transported to the blast furnaces by rail. With the development of the manufacture of coke as a by-product, which began about 1913, the manufacturers were enabled to dispense with rail transportation for their coke but the Pittsburgh manufacturers gained the greater advantange by reason of the fact that they were able to transport coal for coking purposes by barge. Coke does not lend itself to movement by water.

To show the general effect of these changing conditions, it was testified that the transportation costs of assembling material for the manufacture of one ton of pig iron at Youngstown in 1913 amounted to $2.37 and at Pittsburgh $2.63. In 1918, with the use of by-product coke instead of beehive coke, these comparative figures had changed to $3.28 for Youngstown and $2.49 for Pittsburgh; and in 1928 they became $4.44 and $3.11, respectively.

Due to these changes in circumstances, it is claimed, the progress of the Youngstown industries and of the entire community largely dependent thereon has been arrested, and its principal manufacturers for years have been considering the feasibility of acquiring such rail connections with the Ohio river as will enable them to utilize the river transportation, thus decreasing to some extent the disadvantage which they now suffer in comparison with manufacturers of similar commodities in the Pittsburgh district.

Will Talk on Nickel and Chromium in Iron

F. B. Coyle, development and research department, International Nickel Co. Inc., Bayonne, N. J., will address the students of the extension course in engineering, University of Cincinnati, Jan. 11, on the effect of nickel and chromium on cast iron. An explanation in simple terms illustrated with lantern slides of what cast iron is and why it is different from other metals. Limits of strength of ordinary cast iron and the effect of alloying it with nickel and chromium will be discussed. He will also speak of using special processes for the production of high strength cast iron. The meeting will be open to the public and a special invitation has been extended to the local chapter of the American Society for Steel Treating.

Form Wire Rope Cartel

Washington, Dec. 24.—German manufacturers of wire rope are reported to have formed a cartel for the regulation of the export trade in this commodity with the Scandinavian and Baltic countries, according to the department of commerce.

Membership of the cartel is said to number all of the largest and most of the medium-sized German producers specializing in the manufacture of wire rope, Trade Commissioner James E. Wallis, Berlin, states.

It is proposed that the cartel shall regulate export prices. At present the current domestic market for wire rope is rather quiet, with the position of the export trade rather better. The industry as a whole is now operating at an average rate of 50 per cent.

Hacksaw Makers Elect

The Hacksaw Manufacturers association of America at a recent meeting at New York elected the following offijcers for the coming year; President, W. E. Cross, treasurer of Clemson Bros. Inc., Middletown, N. Y.; first vice president, Carl G. Davis, treasurer of the American Saw & Manufacturing Co., Springfield, Mass.; second vice president, E. S. Norvell, sales manager, E. C. Atkins Co., Indianapolis; treasurer, Phillip C. Rogers, treasurer, Millers Falls Co., Millers Falls, Mass.; secretary, William P. Jeffery, New York.

American millstones have been and still are made for the most part of quartz sandstone and conglomerate, chiefly in Ulster county, N. Y., and Montgomery county, Va.

CONSTRUCTION and ENTERPRISE

Concise Timely Business Building Opportunities from Field of Industry

East Central

BELLEVILLE, ILL.—Baker Stove Co., 818 South Church street, plans the construction of a 3-story stove manufacturing plant. Gill & Jackson, Buder building, 707 Market street, St. Louis, are architects.

CHICAGO—Roy Mfg. Co., 22 West Austin avenue, manufacturer of metal jewelry trays, store and display fixtures, etc., has taken a lease on a 5-story building at 220 West Huron street. The building will be remodeled and new equipment will be installed. A new oil burning plant will also be installed.

CHICAGO—Joslyn Mfg. & Supply Co., 120 South LaSalle street, manufacturer of electrical equipment and supplies, has purchased 23 acres on Fullerton avenue where it will establish a woodworking plant and other buildings.

CHICAGO—Raffel Mfg. Co., 4443 Armitage avenue, has purchased property 100 x 134 feet, at 4528 Fullerton avenue, where it will erect a plant for the manufacture of radio parts.

CHICAGO—Pines Winterfront Co., 404 North Sacramento avenue, has awarded the general contract for the construction of a 2-story manufacturing plant to Scown Building Co., 36 West Randolph street. (Noted Nov. 22.)

CHICAGO—American Skylight Co., 2625 Fletcher street, has awarded the general contract for the construction of a new plant to Regan Construction Co., 228 North La Salle street, Chicago.

CHICAGO—American Steel Foundries, 410 North Michigan avenue, has awarded a general contract to Sumner-Sollitt Co., 307 North Michigan avenue, for a 1-story addition to its plant at East Chicago, Ind., 75 x 100 feet.

CHICAGO—City Brass Works Co., 1742 Carroll avenue, manufacturer of nickel silver, brass and bronze fittings and hardware, is considering plans for a new foundry for erection in 1929.

EAST ST. LOUIS, ILL.—Union Electric Light & Power Co., St. Louis, has work under way on extensions and improvements in its steam operated electric power plant at Cahokin, near here. The work includes the installation of a 75,000-kilowatt turbo-generator.

ROCKFORD, ILL.—Greenlee Bros. Inc., Twelfth street, has awarded a general contract to John M. Anderson, 1235 Jackson street, for a 1-story foundry addition 120 x 350 feet.

CONNERSVILLE, IND.—Auburn Automobile Co., Auburn, Ind., plans the installation of power equipments in its new additions to the plant here.

EVANSVILLE, IND.—The recent addition to the Evansville Malleable Castings Co. was a minor plant enlargement to make room for 12 more molders. Plans for expanding the plant sufficiently to double its present capacity are being formulated and construction will probably be started within the next 6 months. New equipment will be installed at that time.

SHELBYVILLE, IND.—Columbia Canning Co., Cambria, Wis., plans the installation of power equipment in its proposed canning plant here. The construction of a boiler house is also contemplated.

DETROIT—Zenith-Detroit Corp., Hart avenue, has awarded the general contract for the construction of a new plant to Frank N. Cooper Co.

KALAMAZOO, MICH.—Consumers Power Co., D. E. Karn, 103 South Rose street, district manager, plans the construction of a 2-story power plant addition.

ROSSFORD, O.—Power equipment will be installed in the new plant unit of the Edward Ford Plate Glass Co. here.

CINCINNATI—St. Gregory Seminary, 325 West Eighth street, plans the construction of a 1-story boiler house and garage.

CLEVELAND—Ohio Piston Co., 5337 St. Clair avenue, has purchased a one-story building, adjoining its main plant, which it has been occupying. This building has foundations to carry two more stories, which it is said may be added next year.

CLEVELAND—Directors of the Cleveland Electric Illuminating Co., Public Square, have voted $11,000,000 for extensions and improvements in 1929. Additional generating capacity at the Avon, O., plant is contemplated.

CLEVELAND—Board of education will take new bids on the construction of a 1 and 2-story foundry addition. F. G. Hogan, East Sixth and Rockwell streets, is director. (Noted Nov. 8.)

TOLEDO, O.—Dart Boat Co. has let the general contract for the Construction of a 1-story boat manufacturing plant, 60 x 300 feet to Manmann Co., 912 Summit street.

BELOIT, WIS.—Fish Rotary Oven Co., now located at Walworth, Wis., and manufacturing rotary ovens for bakeries, has purchased a site on Henry avenue, near the Milwaukee railroad tracks, in Beloit, and will build a new plant, starting work about March 1. George K. Blakely is secretary and treasurer.

BELOIT, WIS.—General Refrigerator Co., 126 East Shirland avenue, formerly the Lipman Automatic Refrigerator Co., has announced plans for a large addition to its works early in the coming spring. T. E. Swords, Silver Creek road, Rockford, Ill., is president of the company.

BURLINGTON, WIS.—Western Metal Specialty Co., 1251 Thirtieth street, has started excavation work for a works addition. The concern manufactures freight car heaters, chemical toilets, and metal stampings and specialties for the automobile trade. Julius J. Goetz is president and manager.

DE PERE, WIS.—Bids close Dec. 28 in the office of M. J. Maes, secretary of the municipal water department for one turbine type deep well pump and one gas-engine driven centrifugal pump.

MADISON, WIS.—Wisconsin Power & Light Co., 16 North Carroll street, has awarded the contract for the construction of a hydroelectric generating plant for its subsidiary, the Rockton Electric Co., Rockton, Wis. The power house will be 32 x 65 feet, most of the equipment to be furnished by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. M. L. Webber, 1160 Emerald street, Madison, is building contractor. Work will start Jan. 15.

MILWAUKEE—Bids are being asked until Jan. 3, for the addition to the Boys' Trade and Technical school. Frank M. Harbach is secretary and business manager of the Milwaukee board of education. The school will be a 3-story structure and contains shops, class rooms and an auditorium.

MILWAUKEE—Western Metal Specialty Co. has awarded the contract for the construction of a new addition and office building. This is the third addition made within the year and will increase the manufacturing facilities 25 per cent.

Resale News

Sale of the operating properties of the Puget Sound Electric Co., Tacoma, Wash., has been set for Feb. 25, when bids will be opened.

Sales Calendar

Dec. 31—Auction navy surplus and surveyed materials at New York navy yard.

Feb. 25—Bids opened on operating plants of Puget Sound Electric Co., Tacoma, Wash.

Western States

MONTENSANO, WASH.—Plans are made for the extension of power and light service to this city and Elma, by the Puget Sound Power & Light Co.

SEATTLE—R. M. Bunten Co. has been or-

Machinery

Large Carryover of December Business and Renewed Inquiries Point to Active First Quarter—Further Rumors of Price Advance

CURRENT buying of machine tools and shop equipment, although somewhat curtailed as is to be expected for this time of the year, still is sufficient to make December one of the best months in the year. Inquiries have increased in most sections with prospects of considerable business being closed soon after Jan. 1 due to the fact that many buyers have postponed definite action until after the holidays. Lathes, radial drills and punch presses lately have been especially active. Automotive buying and grinding machinery have held steady. Additional rumors are heard of possible advances in prices early next year. Demand for automatics and individual motor equipment is fair while small tools are in good call with jobbers' stocks low.

Chicago, Dec. 24.—Surprising activity features the present machine tool market in this territory. It develops that December will be one of the best months in the year. Several dealers in this district report 1928 business 35 to 40 per cent ahead of the preceding year. January will see a large carryover of business from December, as several buyers have postponed action until after the holidays. Several good orders for lathes and radial drills were closed during the week. Radial drills and punch presses have been especially active in the past few months. A Rockford, Ill., concern purchased a horizontal boring mill and several horizontal boring mills were sold in the immediate Chicago territory. Austin Mfg. Co. and the Buda Co., Harvey, Ill., have purchased several drills against their lists, the former having bought a radial drill. Union Pacific railroad is asking bids on a universal grinder, welding equipment, shears and a small pipe machine. Chicago & North Western also is inquiring for a small pipe machine. Other Western railroads have been asking for preliminary figures for making out their budgets. Machine tool builders are making fairly good deliveries. Further rumors are heard of possible advances in prices early next year.

Worcester, Mass., Dec. 24.—Machine tool makers are closing a satisfactory year as to volume in New England and plants as a rule will finish well ahead of 1926. Plants are operating near capacity in many lines to make delivery on heavy business booked several weeks ago. Current buying has been somewhat curtailed, but inquiries have increased with the prospect of considerable business being closed early in the year. Automotive buying has held especially steady during the year and forge plants have also had a highly satisfactory year. Earnings of the latter show good gains as a rule. Grinding machinery was held steady for a long period and is going into a larger number of industries than ever. Demand for automatics and individual motor equipment is fair. Machine shop trade is brisk in spots. Small tools are in good call with jobbers' stocks low. Parts makers are active and foundry melt is gradually on the gain with raw materials well down to requirements. Only do textiles lag, and the few rallies in that machinery branch have generally been of brief duration.

Pittsburgh, Dec. 24.—Machinery is in a quiet market, action on pending tools being postponed until after the first of the year. A fair volume of business is on inquiry, however, and prospects for the first quarter are regarded favorable.

NewEnglandEmployment Shows Increase

Boston, Dec. 24.—Industrial conditions in New England continued to improve throughout November, according to a recent report of the department of labor and industry. The returns of 996 Massachusetts establishments covering October and November showed an increase of six-tenths of 1 per cent in the number employed. Slight increases were shown in car repairs, in cutlery and tools, foundry products, machine shop products and machine tools. The average weekly earnings for all industries declined from $25.11 in October to $24.61 in November.

Employment agencies and many manufacturers report industrial activity well sustained for the first half of December.

Saw Makers Increase

Manufacture of saws in the United States increased from 71 establishments in 1925 to 77 in 1927, according to the biennial census of manufacturers by the department of commerce. Values of products in 1927 were as follows: Woodworking saws, power, circular, $4,003,183; woodworking saws, power, other than circular, $3,546,758; woodworking saws, hand, $6,571,996; metalworking saws, power and hand, $3,909,462; other saws, $361,451; other products and receipts for repair work, $4,235,140; making a total of $22,627,990, a decrease of 8.4 per cent as compared with $24,709,211 for 1925, the last preceding census year.

Of the 77 establishments reporting for 1927, 11 were located in Massachusetts, 11 in New York, 9 in Illinois, 8 in Ohio, 8 in Pennsylvania, 6 in Michigan, 4 in Connecticut, 2 each in California, Indiana, Oregon, Tennessee, and Wisconsin, 1 each in Alabama, Georgia, Louisiana, Maryland, Mississippi, New Hampshire, New Jersey, Rhode Island, South Carolina and Washington.

CRANE ORDERS PLACED

3-ton special type handpower crane for installation over the elevator machinery of the New Amsterdam Casuality Co.'s office building, 50 John street New York, to New Jersey Foundry & Machine Co.; 2-ton electric crane, 30-foot span, floor controlled, for Sutton & Suderly Brick Co., Coemans, N. Y., to Shepard Electric Hoist & Crane Co.

CRANE ORDERS PENDING

100-ton electric overhead crane for a power plant in the state of Washington for Stone & Webster, Boston; early action expected.

Manitoba Bridge to Build at Calgary

Washington, Dec. 24.—The Manitoba Bridge & Iron Works Ltd., Winnipeg, Man., which now operates a rolling mill at Selkirk, Man., is planning to erect a new plant at Calgary, according to the department of commerce.

This new unit, which will produce light structural steel, bars, rods, plates, and castings, will employ about 160 men, and when completed will represent an initial cost of about $400,000. The greater part of the equipment is being taken from two rolling mills, one at Medicine Hat and the other at Redcliff, Alta., which the parent company purchased last summer and which are now about to be dismantled.

This new mill will constitute the second steel company in Calgary, the Riverside Iron Works Ltd., already being in operation there on a fairly substantial scale producing shapes, iron castings, machinery, etc.

M. K. & T. Gives Budget

A total of $6,514,000 will be spent by the Missouri, Kansas & Texas railroad during 1928 for improvements. Rail laying will take up $2,070,000, ballasting $251,000, grade revision $502,000, bridges and trestles $644,000, signal and interlocking plants $183,500, for shop buildings and engine houses $655,400, for machinery and tools $156,142.

The December "Research Narratives" of the Engineering Foundation, New York, deals with "Chromium, A Helper of Iron in Service to Man."

Construction and Enterprise

(*Concluded from Page* 1693)

ganized and has established a fully equipped machine shop at Eleventh avenue southwest and Spokane street where it will specialize in marine repair work.

WENATCHEE, WASH.—Puget Sound Power & Light Co. is engaging in preliminary work preparatory to the construction of its proposed Rock Island power project.

Southern States

BESSEMER, ALA.—It is reported that a local site will be chosen for the car-building plant which the Pullman Car & Mfg. Corp., Chicago, D. A. Crawford, president, will erect in the Birmingham district.

BRUNSWICK, GA.—Mutual Light & Water Co. plans extensions and improvements in power plant and system, including the installation of additional equipment.

LOUISVILLE, KY.—The Stiglitz Furnace Co., 123 West Main street, suffered fire damage recently.

ELIZABETHTON, TENN.—Power plant equipment will be installed by the American Glanzstoff Corp. in its second unit at local rayon mill.

BEAUMONT, TEX.—Kansas City Southern railroad, Kansas City, Mo., soon will award the contract for the construction of shop facilities, switching yard, warehouse, etc.

HOUSTON, TEX.—American Maracaibo Oil Co., 100 Broadway, New York, will install power equipment in the refining plant it is building near here.

HOUSTON, TEX.—Wackman Welded Ware Co., Seventh avenue and Victor street, St. Louis, of which Louis B. Wackman is president, is erecting a 1-story plant, 20 x 90 feet.

SAN ANTONIO, TEX.—Alamo Iron Works, Fayette and Montana streets, will use its own staff in erecting a 60 x 96-foot addition to its pipe shop.

RICHMOND, VA.—Richmond Car Works, a subsidiary of the Standard Steel Car Co., Frick building, Pittsburgh, contemplates beginning work on a plant addition within 60 days.

North Atlantic

BALTIMORE—New Process Casting Co., 46 Franklin building, plans to build a plant.

STRATFORD, CONN.—Sikorsky Aircraft Corp., Garden City, Long Island, N. Y., has awarded the contract for the construction of an airplane manufacturing plant to W. J. Shaughnessy Jr. Inc., 119 Fairfield avenue, Bridgeport, Conn.

BALTIMORE—Edward Katzinger Co., 1949 North Cicero avenue, Chicago, manufacturer of bakers' equipment, plans the installation of power equipment in its proposed 2-story plant to be constructed here.

MILLBURY, MASS.—Millbury Steel Foundry Co. has started construction work on a new addition to its plant on Howe avenue. The company will also construct an office building.

NEWARK, N. J.—Hoffman Beverage Co., 406 Grove street, plans the installation of power equipment in its proposed 6-story plant addition.

NUTLEY, N. J.—Hoffman-LaRoche Chemical Co., 19 Cliff street, New York, plans to install power equipment in the 4-story plant it will build here.

PATERSON, N. J.—United States Hammered Piston Ring Co. Inc., 1222 South Grove street, plans the construction of a 1-story manufacturing plant. A. W. Wenzel is president and general manager.

TRENTON, N. J.—Crescent Insulated Wire & Cable Co., Olden avenue and Taylor street, has awarded the general contract for the construction of a 2-story manufacturing plant to Karno-Smith Co., Broad Street Bank building.

BATAVIA, N. Y.—Doehler Die Casting Co. has broken ground for a new plant unit, to be used as a permanent mold production plant.

BROOKLYN, N. Y.—Weihl Bros., care Tobias Goldstein, 26 Court street, Brooklyn, architect, have asked bids on a general contract for a new foundry building.

ELMIRA, N. Y.—Elmira Iron & Metal Co. suffered damage to its plant in a fire Dec. 12.

LOCKPORT, N. Y.—Harrison Radiator Corp., Walnut street, plans the installation of power equipment in the 1-story plant addition it will build.

PHELPS, N. Y.—Empire State Pickling Co. plans the installation of power equipment in the plant it plans rebuilding after suffering fire damage, Nov. 28.

AMBRIDGE, PA.—Spang, Chalfant & Co., Clark building, Pittsburgh, is taking bids on a 1-story plant addition, 340 x 800 feet.

BESSEMER, PA.—Metropolitan Paving Brick Co. plans to install power equipment in the plant it will rebuild following a fire loss.

HARRISBURG, PA.—Commonwealth of Pennsylvania, department of property and supplies, Capitol building, plans the construction of a 1-story power plant.

PHILADELPHIA—Pennsylvania Metallic Tubing Co., Elmwood avenue and Seventy-third street, has awarded to E. H. Keefer & Son, Philadelphia, the contract for an addition, 2 stories, 45 x 125 feet.

West Central

DES MOINES, IOWA—Des Moines Steel Tank Co. contemplates the construction of a manufacturing plant. J. H. Albrecht, 1819 East Court street, is president of the company.

WICHITA, KANS.—Swallow Airplane Co. plans the installation of power equipment in its plant expansion program.

ST. LOUIS—South Side Machine Co., 4016 Nebraska street, plans the construction of a 1-story manufacturing plant. Leonard Haeger, 3844 Utah place, is architect.

GRAND ISLAND, NEBR.—City of Grand Island plans the construction of a 1-story power plant. O. A. Abbott is mayor.

Canada

VANCOUVER, B. C.—Consolidated Mining & Smelting Co. is ready to proceed with the construction of a copper smelter and refining plant on the Pacific coast.

PORT HOPE, ONT.—Matthews Conveyor Co. is making arrangements for a plant addition.

QUEENSTOWN, ONT.—Provincial Hydro Electric Power Commission will add another unit with 65,000-horsepower capacity to its power development here.

TORONTO, ONT.—Toronto Iron Works has purchased a 9-acre site on Eastern avenue on which it will erect a modern plant for the manufacture of steel plate. Work is to be started immediately.

New Construction and Enterprise

Recent Incorporations

BOSTON—Abrasive Products Inc. has been incorporated with $100,000 in preferred shares and 5000 shares no par value stock to manufacture and deal in abrasives, etc., by Winfield C. Towne, 232 Bay State road, Boston.

BROOKLINE, MASS.—Norge Boston Sales Corp. has been incorporated with $50,000 capital to manufacture and install all kinds of apparatus for heating, cooking, etc., by Max Seltzer, 9 Belfry terrace, Lexington, Mass.

BAYONNE, N. J.—Globe Iron Works Inc. has been incorporated with 750 shares no par value stock to engage in the metalworking business by Prentice Hall Inc., 70 Fifth avenue New York.

NEWARK, N. J.—Sacks-Barlow Foundries Inc. has been incorporated with 2500 shares common stock no par value to operate foundries and deal in steel and iron, by Bilder & Bilder, Newark.

NEWARK, N. J.—Rutherford Electric Co. has been incorporated with $125,000 capital to manufacture electrical supplies by Burnett, Murray & Trelease, Newark.

NEWARK, N. J.—Alliance Machine & Engineering Co. has been incorporated with $3000 capital by W. P. Murphy, Newark, attorney.

NEW YORK—Jayee Machine Co. has been incorporated with 2000 shares no par value to operate general machine shops, by A. Norick, 1440 Broadway.

NEW YORK—Majestic Paving Co. has been incorporated with 1000 shares common stock to manufacture paving machines, by Hoffman & Golder, attorneys, Chicago.

ROCHESTER, N. Y.—Griffin & Yengst Metal Finishing Corp. has been incorporated with $6000 capital by L. T. Minton, Rochester, attorney.

NORRISTOWN, PA.—Woodworking Machinery Co. Inc. has been incorporated with $50,000 capital to manufacture and deal in all kinds of machinery, by Bertha Weber, Glenside, Pa.

PHILADELPHIA—Wilbar Co. Inc. has been incorporated with $10,000 capital to manufacture appliances, etc., by Robert W. Yarrington, 1512 Sixty-eight avenue, Philadelphia.

PHILADELPHIA—Reliance Bronze & Aluminum Foundry Co. has been incorporated with $10,000 capital to engage in the bronze and aluminum foundry business, manufacture metal products, etc., by Alfred Haeberle, 268 West Fishers avenue, Philadelphia.

PHILADELPHIA—Philadelphia Metal Works Inc. has been incorporated with 100 shares no par value stock to manufacture and deal in machinery and parts, by M. A. Regan, 5903 Cobbs Creek Parkway, Philadelphia.

PHILADELPHIA—Columbia Welding Co. has been incorporated with $5000 capital to engage in welding, brass foundry and machine shop business by William R. Rorer, 1120 Harrison street, Philadelphia.

PHILADEDPHIA—Pennsylvania Forge Corp. has been incorporated with 50 shares no par value stock to manufacture and produce iron and steel articles, etc., by George Wanger, 833 West Marshall street, Norristown, Pa.

PHILIPSBURG, PA.—Lee Metal Products Co. Inc. has been incorporated with $100,000 capital to manufacture iron and steel products, etc., by J. Munson Lee, Philipsburg.

PITTSBURGH—Essen Steel Co. has been incorporated with $15,000 capital to manufacture and deal in tool steel, etc., by E. A. Geissen, 6537 Darlington road, Pittsburgh.

WILKES BARRE, PA.—Bidini Mfg. Co. has been incorporated with $10,000 capital to manufacture drilling and mining machines, etc., by Camillo Rinaldo, 102 Maffet street, Plains, Pa.

WILKES BARRE, PA.—Royer Automatic Valve Cap Co., 505 Brooks building, has been incorporated with $5000 capital to manufacture, repair and deal in valves, caps, motor accessories, etc., by Arthur E. Royer.

CALGARY, ALTA.—The Motor Chain Applier Co. Ltd. has been incorporated to manufacture and deal in automobile tire chain applier, with $100,000 capital by Albert A. Dick, John Gibson, James M. Affleck, all of Calgary.

VANCOUVER, B. C.—Vancouver Central Heating & Power Co. Ltd. has been incorporated with $750,000 capital and 30,000 shares no par value stock by Roydon S. Stultz, Gordon M. Sloan, Earnest B. Bull, all of Vancouver.

TORONTO, ONT.—City Builders Ltd. has been incorporated to carry on the business of contractor and manufacturer of builders' supplies, with $40,000 capital by Benjamin Luxenberg, Isadore Levinter, and Benjamin Grossberg all of Toronto.

MONTREAL, QUE.—Machine Works Ltd. has been incorporated to carry on the business of engineer, machinist, blacksmith, boilersmith, etc., with $50,000 capital by Joseph A. Duplessis, Omer F. Lefebvre, Gerald J. Duplessis and others, all of Montreal.

MONTREAL, QUE.—Mercus Helliwell Ltd. has been incorporated to manufacture and deal in railway and track supplies, with $50,000 capital by Wallace L. Helliwell, Kate A. Mercur and William M. Murphy, all of Montreal.

New Incorporations In Separate Listing

AS NEWS of the incorporation of a concern in the metalworking field is a direct lead to a prospective buyer of various lines of products included in the field of IRON TRADE REVIEW, *notice of such incorporations, as received from various secretaries of state, are being segregated from other news in the Construction and Enterprise department. This makes reference easier for those who regard these leads as more important than others. The arrangement is alphabetical by states.*

New Trade Publications

MILLING MACHINES—A bulletin by the Shields Machine Tool Co., New York, features its milling machines. Illustrations show the machines and details and full specifications are given.

ELECTRIC METERS—Sangamo Electric Co., Springfield, Ill., has issued a bulletin covering its meter for use in electroplating work. This is used in controlling the current used in electroplating, avoiding calculations.

ALLOY TOOL STEELS—Edgar Allen & Co. Ltd., Sheffield, England, has issued a handbook of its intermediate steels, their scope, character, performance, uses and treatment. Illustrations supplement the text.

GALVANIZING EQUIPMENT—Roller levelers and squaring shears for use in connection with sheet galvanizing plants are shown in a bulletin by the Erie Foundry Co., Erie, Pa. Diagrams and illustrations supplement the text.

AUTOMATIC DIES—Jones & Lamson Machine Co., Springfield, Vt., in a current leaflet calls attention to need for tools of modern type to do best work in machining metals. Automatic dies and chasers are suggested as one means to that end.

ELECTRICAL RECORDING UNITS—Esterline-Angus Co., Indianapolis, has issued a leaflet on its recording units for use in the purchase and sale of electricity. Illustrations include charts showing application to this industry.

STEEL LOCKERS—Durabuilt Steel Locker Co., Aurora, Ill., has issued a folder containing much information about steel lockers. It contains illustrations of a large variety of lockers, basket racks and trucks.

LUBRICATION—Reswick Lubricator Co., Ellwood City, Pa., in a current leaflet calls attention to its system of lubrication, designed to increase the life of bearings on heavy duty machinery in steel plants and other industrial units. Details are illustrated.

INDUCTION MOTORS—A bulletin by the Allis-Chalmers Mfg. Co., Milwaukee, describes its large polyphase induction motors. Details of construction are illustrated and accessories are shown. Actual installations of large motors are presented.

THREADING MACHINES—Landis Machine Co., Waynsboro, Pa., has published a catalog of its bolt threading, staybolt threading, bolt factory threading and automatic forming and threading machines. It also contains data regarding its various types of bolt threading die heads and chasers. It is well illustrated.

KNIFE GRINDERS—Seybold Machine Co., Dayton, O., in a current bulletin describes a grinder for knives used in its cutters and trimmers. Claims for the grinder are accuracy, uniformity and freedom from burning. Illustrations show details of the grinder and its method of use. Specifications are shown.

AIR COMPRESSORS—Ingersoll-Rand Co., New York, has issued a bulletin announcing a new type of direct connected gas engine driven compressor, consisting of a 2-cylinder, 4-cycle gas engine, direct connected to compressing cylinder with plate-type valves. Illustrations show its construction and operation.

Empire Metal Furniture Sheets

MANUFACTURERS of Metal Furniture find in Empire Steel Sheets all the essentials of quality that enable them to build beauty, durability and expert craftsmanship into their products. No matter whether your requirements are large or small, usual or unusual, you'll find it well worth while to discuss them with an Empire sales engineer.

Empire Steel Corporation, Mansfield, O.

SALES OFFICES: New York, Philadelphia, Cleveland, Indianapolis, Cicero (Suburb of Chicago), Detroit, St. Louis

Discounts and Extras

Steel Pipe

Pittsburgh and Lorain basing discounts, jobber's carloads.

Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount.

Chicago takes differential 2½ points less than Pittsburgh-Lorain basis.

Butt Weld

	Black	Galvanized
⅛-inch	45	19½
¼ and ⅜-inch	51	25½
½-inch	56	42½
¾-inch	60	48½
1 to 3-inch	62	50½

Lap Weld

2-inch	55	43½
2½ to 6-inch	59	47½
7 to 8-inch	56	43½
9 and 10-inch	54	41½
11and 12-inch	53	40½

REAMED AND DRIFTED

Butt Weld

1 to 3-inch	60	48½

Lap Weld

2-inch	53	41½
2½ to 6-inch	57	45½

EXTRA STRONG—PLAIN ENDS

Butt Weld

⅛-inch	41	24½
¼ and ⅜-inch	47	30½
½-inch	53	42½
¾-inch	58	47½
1 to 1½-inch	60	49½
2 to 3-inch	61	50½

Lap Weld

2-inch	53	42½
2½ to 4-inch	57	46½
4½ to 6-inch	56	45½
7 to 8-inch	52	39½
9 and 10-inch	45	32½
11 and 12-inch	44	31½

DOUBLE EXTRA STRONG

Butt Weld

½-inch	42	32½
¾ to 1½-inch	45	35½
2 to 2½-inch	47	37½

Lap Weld

2-inch	41	32½
2½ to 4-inch	43	34½
4½ to 6-inch	42	33½
7 to 8-inch	38	25½

(Note—Large jobbers obtain additional preferential discounts of 1 and 5 on black and 1½ and 5 on galvanized. Extra 5 per cent granted in the 4th quarter 1927 and 1st quarter 1928 discontinued April 2, 1928.)

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers' carloads. Individual quotations made on delivered basis.

THREADS AND COUPLING

Butt Weld

¼ and ⅜-inch	+11	+39
½-inch	22	2
¾-inch	28	11
1 to 1½-inch	30	18

Lap Weld

1¼ and 1½-inch	Upon application	
2-inch	23	7
2½ to 3-inch	26	11
3 to 6-inch	28	13
7 to 12-inch	26	11

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG, PLAIN ENDS

¼ and ⅜-inch	+19	+54
½-inch	21	7
¾-inch	28	12
1 to 1½-inch	30	14

Lap Weld

2-inch	23	9
2½ to 4-inch	29	15
4½ to 6-inch	28	14
7 to 8-inch	21	7
9 to 12-inch	16	2

DOUBLE EXTRA STRONG

Butt Weld

½-inch	+47½	+59½
¾-inch	+28	+40
1-inch	+34	+46
1¼-inch	+28	+40
1½-inch	+27	+39

Lap Weld

2 and 2½-inch	+13	+25
3 and 4-inch	+ 8	+17
4½ to 6-inch	+ 9	+18
8-inch	+12	.....

(Note—Large jobbers obtain additional preferential discounts of 1, 5 and 2½ on black and galvanized.)

Boiler Tubes

Pittsburgh carload discounts. Less carloads 4 points less

STEEL (Lap Weld)

2 and 2¼-inch	27 off
2½ and 2¾-inch	37 off
3-inch	40 off
3¼ to 3¾-inch	42½ off
4 to 4½-inch	46 off
5 to 6-inch	40 off

(Note—Additional discounts of seven extra 5 per cents now being given on 21,000 pounds or more.)

CHARCOAL IRON

1½-inch	+18
1¾-inch	+ 8
2 and 2¼-inch	2 off
2½ to 3-inch	7 off
3¼ to 4½-inch	9 off

(Note—Additional discounts of two 10's and one 2½ now being given on 12,000 pounds or more.)

SEAMLESS COLD DRAWN

1-inch	63 off
1¼ and 1½-inch	55 off
1¾-inch	39 off
2 and 2¼-inch	34 off
2½ and 2¾-inch	42 off
3-inch	48-off
3¼ and 3½-inch	50 off
4-inch	53 off
4½, 5 and 6-inch	45 off

SEAMLESS HOT ROLLED

2 and 2½-inch	40 off
2½ and 2¾-inch	48 off
3-inch	52 off
3¼ and 3½-inch	56 off
4-inch	59 off
4½, 5 and 6-inch	48 off

SEAMLESS STEEL MERCHANT BOILER TUBES

Extras:

Add $8 per ton for more than four gages heavier than standard and add 10 per cent to theoretical weight.

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING

Base Discounts on New List July 1, 1925

Carbon 0.10 to 0.30 per cent.....50 to 55 off
Carbon 0.30 to 0.40 per cent.....45 to 50 off

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES

Net prices per foot f.o.b. Pittsburgh

Outside diameter	Gage	Price
21-inch	12-gage	14¼c
2-inch	11-gage	15c
2-inch	10-gage	16c
2¼-inch	12-gage	16c
2¼-inch	11-gage	17c
2¼-inch	10-gage	18c
3-inch	7-gage	33c
5⅜-inch	9-gage	50c
5½-inch	9-gage	52c

Plus usual extras for forming and for long lengths over 18 feet and for commercially exact lengths.

Plate Extras

BASE

Rectangular plates, tank steel or conforming to manufacturers' Standard Specifications for structural steel, dated Nov. 24, 1922, or equivalent, ¼-inch thick and over on thinnest edge (except for ¼-inch or 72 inches wide when ordered to weight in pounds per square foot—see width and gage extras), 100 inches wide and under, down to but not including 6 inches wide, 5 feet 0 inches long up to published limit in length but not over 80 feet 0 inch, are base. Extras per pound for width or diameter

All Plates Rectangular or Otherwise

¼-inch thick and heavier, but not less than 11 pounds per square foot, if ordered to weigh—

Over 100 inches to and including 110 inches	.05c
Over 110 inches to and including 115 inches	.10c
Over 115 inches to and including 120 inches	.15c
Over 120 inches to and including 125 inches	.25c
Over 125 inches to and including 128 inches	.50c

Plates less than ¼-inch or lighter than 11 pounds per square foot.

Over 72 inches to and including 84 inches	.10c
Over 84 inches to and including 96 inches	.20c
Over 96 inches to and including 100 inches	.30c

Over 100 inches add .35c to width extras for plates ¼-inch thick and heavier.

GAGE

Plates Not Exceeding 72 Inches Wide

Plates less than ¼-inch gage, to and including 3/16-inch; or lighter than 10.2 pounds per square foot, to and including 7.65 pounds per square foot ..... .20c

Plates Over 72 Inches Wide

Plates less than ¼-inch gage, to and including 3/16-inch; or lighter than 11 pounds per square foot, to but not including 7.65 pounds per square foot ..... .20c

Plates ordered 7.65 pounds per square foot ..... .30c

QUALITIES

Pressing steel	.10c
Flange steel (boiler grade)	.15c
Ordinary firebox steel	.20c
Stillbottom steel	.30c
Locomotive firebox steel	.50c
Marine steel	1.50c
Hull materials subject to U. S. Navy Dept. specifications for medium or soft steel	.10c
High tensile hull steel subject to U. S. navy department or equivalent specifications	1.00c
Boiler steel subject to U. S. navy department specifications, classes A and B	1.50c

Hull plates to hull specifications, required to stand cold flanging, take extra for flange steel.

Floor Plates

Checkered plates 1.75c

Checkered plates are not furnished to sketch and are rolled from "Stock Steel" only. No physical tests will be made on checkered plates.

INSPECTION

Mill inspection .....No extra

Charges for other inspection, such as Lloyd's or American bureau of shipping, will be made by inspection bureau direct to buyer.

CUTTING

LENGTH OR DIAMETER

All Plates, Rectangular or Otherwise

Five feet and over up to published limit of length, but not over 80 feet	No extra
Under 5 feet to 3 feet inclusive	.10c
Under 3 feet to 2 feet inclusive	.25c
Under 2 feet to 1 foot inclusive	.50c
Under 1 foot	1.55c
Over 80 feet to 100 feet inclusive	.10c

Over 100 feet add .25c plus .05c for every additional 2 feet or fraction thereof.

Regular Sketches

With not more than four straight cuts. (Including straight taper plates)

Additional extra ..... .10c

Irregular Sketches

With not more than four straight cuts. (Sketches cannot be sheared with reentrant angles)

Additional extra ..... .20c

670

DEC 27 1928

IRON TRADE REVIEW

CLEVELAND, O. DECEMBER 27, 1928

Farrell's 85

A Successful Special Cast Steel! Its purpose is to resist strain, shock, impact, overloading, wear and abrasion. Demand for it is proving that it is equal to that job.

Eradication of weak points and development of desired qualities are offered in Farrell's 85 as a means of uninterrupted and economical operation. Setting up a genuine resistance to forces of destruction, it makes invulnerable all cast parts too readily discarded when made of inferior steels.

PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

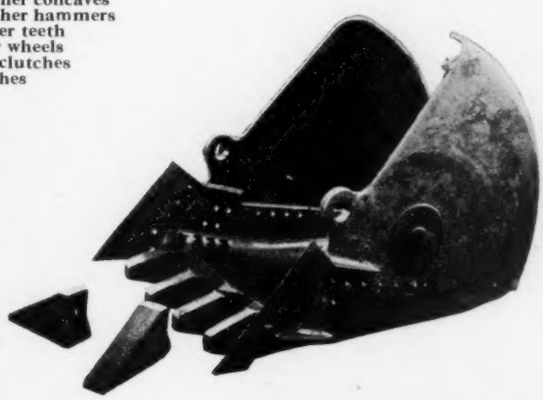
Bucket pins
Bucket bushings
Bucket lips
Bucket fronts
Bucket bails
Bucket teeth
Brackets
Cast tooth gears
Crane wheels
Conveyor buckets
Conveyor flights
Crusher concaves
Crusher hammers
Digger teeth
Idler wheels
Jaw clutches
Latches

Shown here are castings representative of the parts being made of Farrell's 85. Its application extends to thousands of others.

Liner plates
Pinions
Pump casings
Plow points
Pug mill knives
Railway frogs
Racks
Rollers
Skip car wheels
Sprockets
Side cutters
Side plates
Sheaves
Special chain
Screen plates
Track shoes
Tooth inserts
Wheels

It's tough — strong — rigid and hard

Farrell's 85 is a moderately priced cast steel



See our EXHIBIT at the ROAD SHOW —CLEVELAND— Jan. 14-18 inclusive

FARRELL-CHEEK STEEL FOUNDRY CO.—SANDUSKY, OHIO

EASTERN OFFICE—50 CHURCH ST.—NEW YORK

FARRELL-CHEEK

CEMENTILE Roofs are the easiest of all roofs to lay. The tile is simply "laid" in place, directly on the purlins—no sheathing to prepare. Speed is the natural result . . . saving time and cutting down the total roofing cost materially.

With these important economic advantages goes a protection that is unrivalled in degree and length. *Cementile* is proof against the hazards of fire, lightning, wind, snow, sleet, rain and sun, for the average life of a building—with practically no maintenance cost throughout its many years of service.

There are three types of Cementile [1] Red Interlocking; [2] Flat; [3] Channel—also glass lighted Cementile for Skylighting. For engineering data write for the Cementile Catalog.

American Cement Tile Manufacturing Co.

1205 Oliver Building · Pittsburgh, Pa.

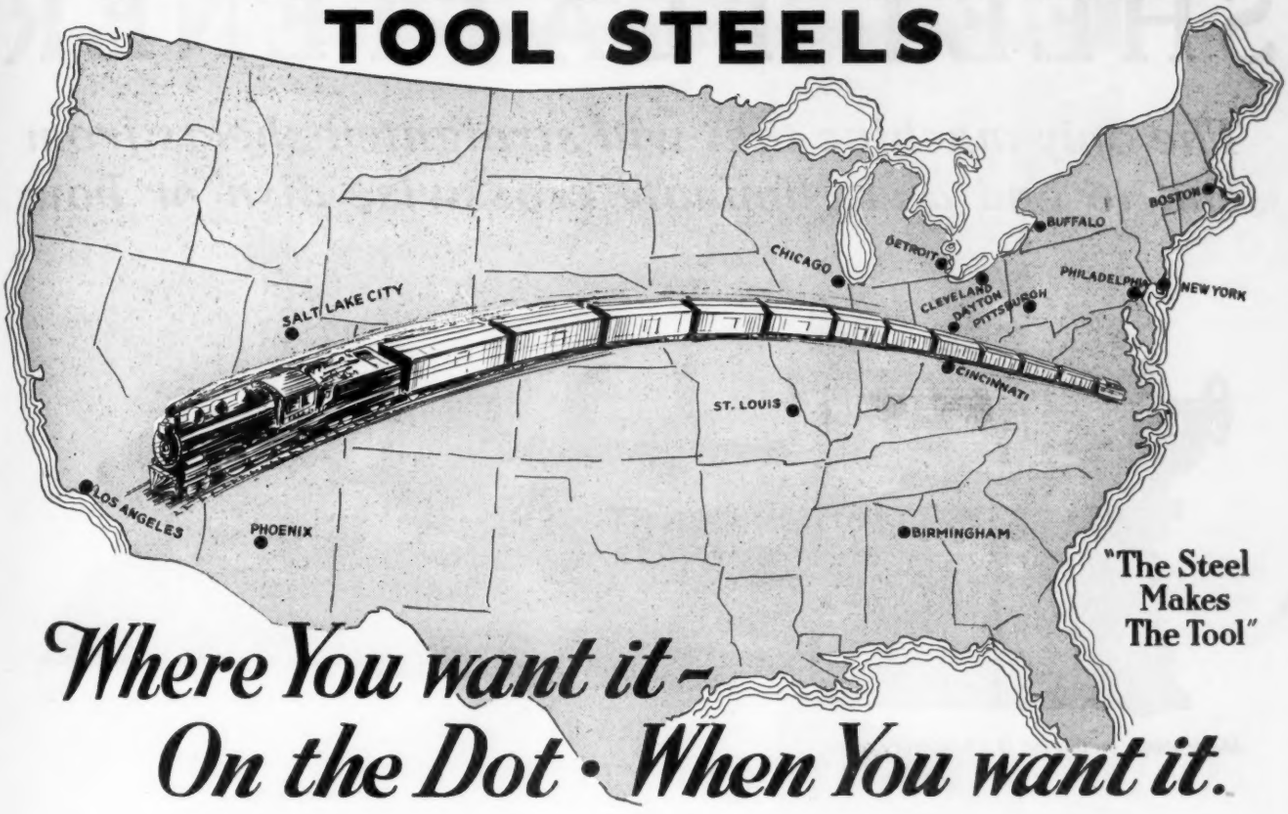
Plants: Wampum, Pa. Lincoln, N. J. Birmingham, Ala.
Offices: Pittsburgh New York Philadelphia Atlanta Birmingham

Simply Lay the Tile in Place

CEMENTILE

Vol. 83, No. 26, Dec. 27, 1928, issue of IRON TRADE REVIEW, published weekly at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, Ohio, under the act of March 3, 1879. Subscription prices $6.00 a year in U. S.; $8.50 in Canada; foreign £2:0:0; single copies 25c.

COLONIAL
TOOL STEELS



"The Steel Makes The Tool"

Where You want it—
On the Dot • When You want it.

DELIVERY—that is another feature, important too, where Colonial means the utmost in Tool Steel service.

Dotting the country, in or near the industrial centers, is a chain of Colonial Warehouses with "your size and grade in stock."

Each warehouse and sales office manned by a corps of trained Tool Steel men—backed by accumulated years of experience, ready to recommend a time-tested Tool Steel to do your job quicker, at less cost.

More than a quarter-century the Colonial brands have stood as the standard of all Tool Steel performance.

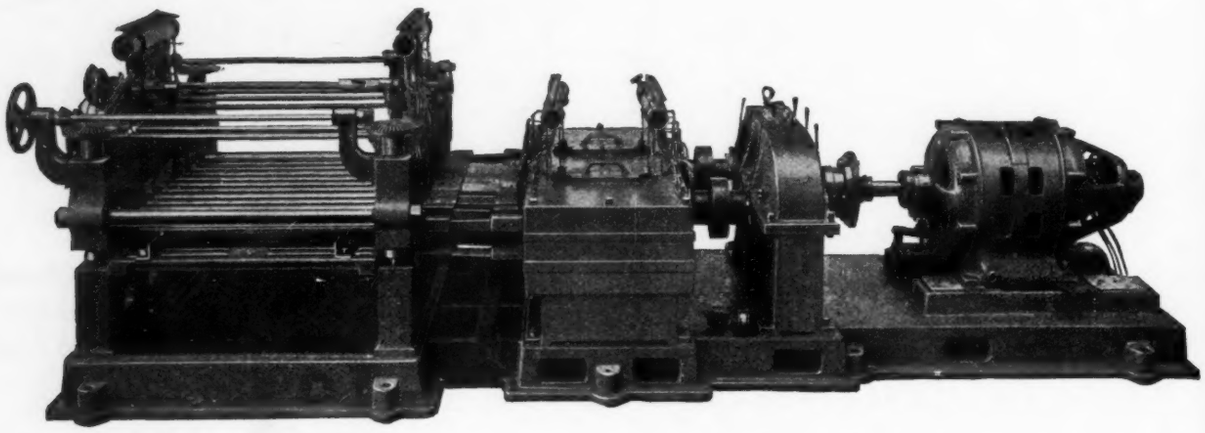
COLONIAL STEEL COMPANY

Pittsburgh Boston New York Philadelphia Buffalo Cleveland Cincinnati
Detroit Chicago St. Louis Salt Lake City Los Angeles

Warehouses and Offices in 12 cities
Your size and grade in stock

Sutton No. 2-B 60" Patented SHEET FLATTENER

The only machine that will straighten sheets from end to end and eliminate crosswise dish or bow



Motor shown on this cut is a temporary set-up

An entirely new principle of flattening sheets, which produces results never before obtained.

Sheets passing through this machine are absolutely flat *both lengthwise and crosswise.*

There is also a marked reduction of *"Stretcher Strains"* in deep drawn sheets due to the more thorough working the sheets get in this leveler.

Machines are equipped with high carbon forged or hardened and ground steel rolls.

Independent adjustment of rolls in patented feature eliminate dish.

Additional independent adjustment of rolls controls deflection of sheet at needed points.

In cut shown above, gears in primary drive are steel cut herringbone. Gears in flexible spindle drive are high grade heat treated tool steel herringbone cut integral with shaft. All gears enclosed in oil tight housings.

Worm and worm wheel drive may be substituted for tool steel herringbone gear drive at a considerable reduction in price.

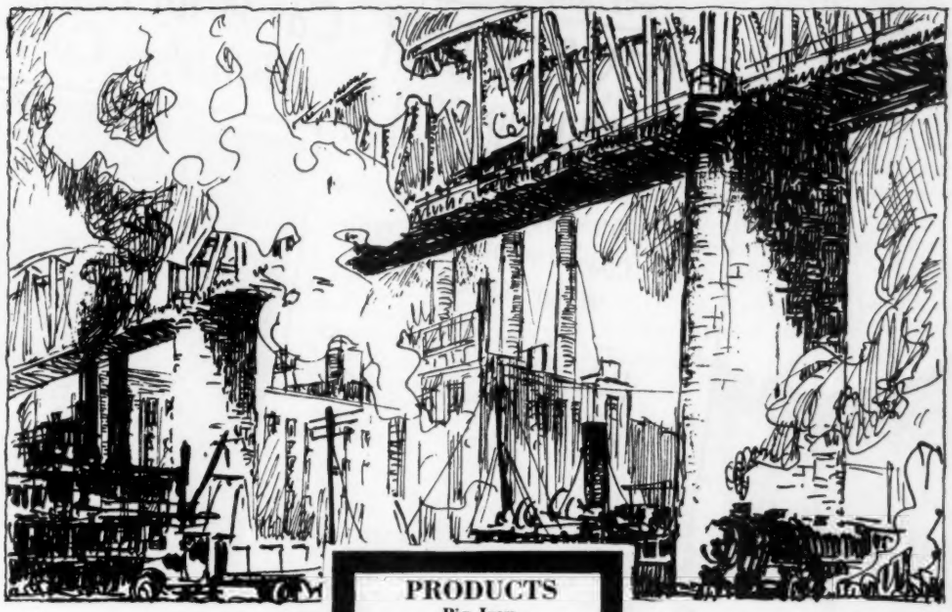
All drive connections are made by means of Flexible Couplings.

Lunkenheimer Sight Feed gravity lubricators or centralized grease lubrication furnished.

Bulletins sent on request.

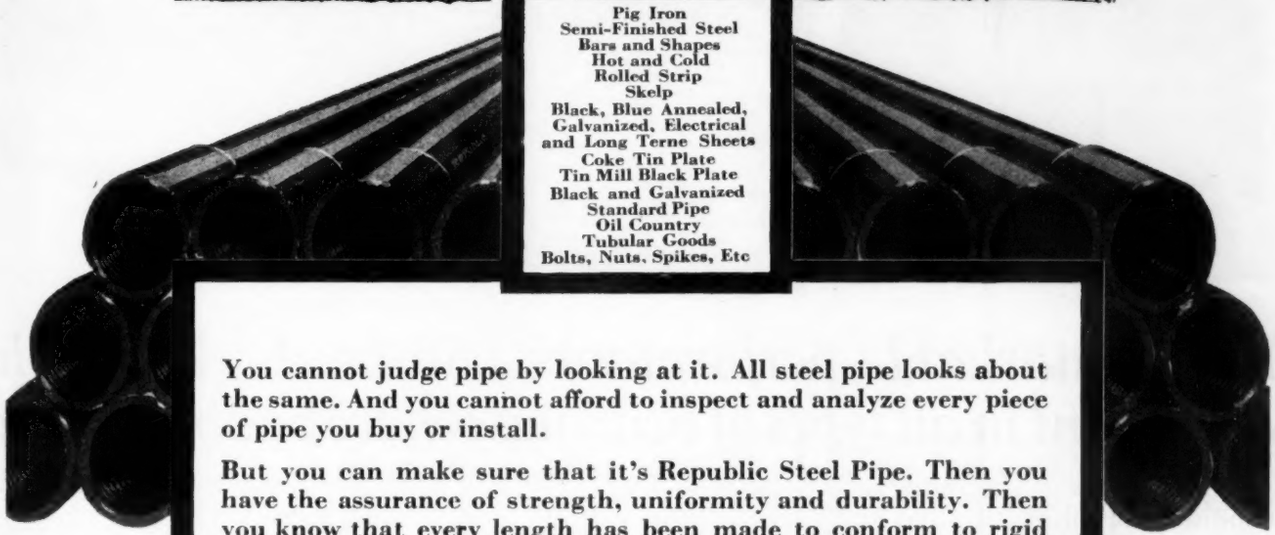
SUTTON ENGINEERING CO.
PARK BUILDING PITTSBURGH, PA.

HOW CAN YOU TELL DEPENDABLE PIPE?



PRODUCTS

Pig Iron
Semi-Finished Steel
Bars and Shapes
Hot and Cold
Rolled Strip
Skelp
Black, Blue Annealed,
Galvanized, Electrical
and Long Terne Sheets
Coke Tin Plate
Tin Mill Black Plate
Black and Galvanized
Standard Pipe
Oil Country
Tubular Goods
Bolts, Nuts, Spikes, Etc



You cannot judge pipe by looking at it. All steel pipe looks about the same. And you cannot afford to inspect and analyze every piece of pipe you buy or install.

But you can make sure that it's Republic Steel Pipe. Then you have the assurance of strength, uniformity and durability. Then you know that every length has been made to conform to rigid specifications . . . has passed severe tests and inspections before it is ever placed on the market. Then you can not only expect, but you can be certain of satisfactory pipe service.

The name Republic on steel pipe is a positive answer to the question of dependability . . . insurance of quality piping in your plant.

Branch Offices

Birmingham
Boston
Buffalo
Chicago
Cincinnati
Cleveland
Dallas
Denver
Detroit
El Paso
Los Angeles
New York
Philadelphia
Pittsburgh
San Francisco
Seattle
St. Louis

REPUBLIC
IRON & STEEL CO. YOUNGSTOWN O.
STEEL PIPE

CLEVELAND PLAIN DEALER
SETS RECORD ON TRIP ACROSS U. S.
1919 Model Car Makes Coast-to-Coast Run With Water in Crank Case.
The greatest transcontinental trip in the history of the automobile was completed late last week when a 1919 model of a popular make of car arrived in Los Angeles, Cal.
Before starting this trip the automobile had already been driven 130,000 miles with nothing but water in the crankcase, and the coast-to-coast trip from Detroit to Boston and across the continent to Los Angeles, including side trips, added 14,000 miles to the speedometer.
No oil has ever been used in the engine, the only lubricant being water, and this is all that was used on the long gruelling trip.
The following telegram heralding the arrival of this car on the west coast was received by the automobile editor of the Cleveland Plain Dealer.
Los Angeles, Cal.,
Completed transcontinental trip on arrival here today Stop Motor running splendidly Stop Nothing but water used in crank case on entire Trip Stop This breaks all records of automobile performance. H. EDWARD LINDEN.
Car With Water in Crank Finishes Coast-to-Coast
UNIVERSITY OF SOUTHERN CALIFORNIA
130000 MILES WITHOUT OIL

This remarkable performance can be duplicated in your plant in all types of bearings where babbitt is used

The secret of the remarkable success of BEARING-OY is that it keeps the shaft in ideal condition for lubrication and under no condition will cut, score or stick to the shaft.

It is impossible at all times to maintain adequate lubrication, and for this reason the bearing metal that will operate under conditions of poorest lubrication offers the highest factor of safety for economical operation.

BEARING-OY can be melted and poured in the same manner as ordinary babbitt with the same equipment and loses none of its ingredients during melting. A BEARING-OY bearing can be machined in the usual manner or it can be poured to a mandrel or poured in place and used without machining. Close fitting is recommended.

BEARING-OY is fully guaranteed to meet the bearing requirements of any user or money will be refunded in full.

Complete Research Laboratory Report will be furnished on request by our distributors

BEARING-OY BEARING METAL

THE WILLIAMS ALLOY PRODUCTS CO. ELYRIA, OHIO, SINCE 1921

Export Office: 67 Wall St., New York City Eastern Engineering Office: H. R. Van Deventer, Inc., 342 Madison Ave., New York

INDAY, DECEMBER 16, 1928
case
Run
"The secret of the success of bea
ing-oy and piston-oy is that they im
prove conditions for lubrication and
under no condition will cut, score or
stick but highly polish.
"Packing-oy is a metallic packing,
a product of piston-oy and bearing-
oy amalgamated with high grade
lubricants and contains no asbestos,
fiber, rubber or other ingredients
that would tend to deteriorate in
service but is 100 per cent. metallic
alloys and lubricants.
"There are no alloys used in the
manufacture of packing-oy that will,
under any condition, cut or score the
pump shaft or piston rod and this
packing contains sufficient lubricant
to maintain a film on the shaft or
rod that materially increases the
factor against leakage.
"Lub-oy oilless bearings (lub-oy
derives its name from lubricated al-
loys) are products of bearing-oy and
picton-oy.
"The operation of an automobile
motor 144,000 road miles in more
than 30 states using water as a
lubricant leads us to believe that
lub-oy bearings which are manufac-
tured from the alloys used in the
piston rings and bearings of this car
amalgamated with high grade lubri-
cants would successfully carry the
Twentieth Century Limited from
New York to Chicago without a
drop of oil or any other form of
lubricant other than that contained
in the lub-oy bearings."
The Williams Alloy Products Co.
started in business in 1921 in Elyria,
O. The company

Packing-oy Metallic Packing

A product of Bearing-oy and Piston-oy

is 100% metal and lubricants. It contains no asbestos, fibre, rubber or other ingredients that deteriorate or injure the rod. PACKING-OY polishes the rod and lubricates it, thereby reducing frictional wear and resultant leakage.

PACKING-OY is prepared in flake form that is easily applied, admirably adapted to all sizes of stuffing boxes thus eliminating the necessity of a long list of different sizes. The plastic character of PACKING-OY insures a snug fit on all rods, even though they are scored. Another great advantage of PACKING-OY is that it never need be removed for repacking—merely add more.

For oil, gas, saturated and super-heated steam, water, oil, alcohol, ammonia, etc.

LUB-OY Oil-less Bearings are products of BEARING-OY and PISTON-OY and are made for all types of machinery where oil-less bearings are adaptable.

DISTRIBUTORS

ALABAMA
Birmingham
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Mobile
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ARKANSAS
Fort Smith
Speer Hardware Co.
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DELAWARE
Wilmington
Atlantic Manufacturing Co.
FLORIDA
Jacksonville
Farquhar Machinery Co.
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Georgia Supply Co.
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Rockford
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INDIANA
Evansville
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Hammond
McLaughlin Mill Supply Co., Inc.
Indianapolis
The E. A. Kinsey Co.
Muncie
Geo. Keiser & Co.
South Bend
The South Bend Supply Co.
Vincennes
Aug. E. Bolk & Co.
IOWA
Davenport
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Lexington
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Louisville
Neill-La Vielle Supply Co.
LOUISIANA
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Weatherwax Supply Co.
Lansing
Van Dervoort Hardware Co.
MINNESOTA
Duluth
W. P. & R. S. Mars
Minneapolis
Northern Machinery & Supply Co.
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Jackson
Mississippi Foundry & Machine Co.
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J. E. Dilworth Co.
Vicksburg
J. E. Dilworth Co.
MISSOURI
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Essmueller Mill Furnishing Co.
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Syracuse Supply Company
Troy
Troy Belting & Supply Co.
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Newark
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Cincinnati
The E. A. Kinsey Co.
Cleveland
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The E. A. Kinsey Co.
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The E. A. Kinsey Co.
Hamilton
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The Cornell Supply Co.
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Philadelphia
Maddock & Company
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Scranton
The Bittenbender Company
RHODE ISLAND
Providence
Belcher & Loomis Hardware Co.
SOUTH CAROLINA
Columbia
Columbia Supply Co.
TENNESSEE
Chattanooga
Mills & Lupton Supply Co.
Knoxville
W. J. Savage Co., Inc.
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Charleston Hardware Co.
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Banks-Miller Supply Co.
Parkersburg
Parkersburg Supply Co.
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The Williams Alloy Products Co.
428 Wisconsin Ave.
MEXICO
Peden Iron & Steel Co.

If your city is not served by any of the above distributors write direct to

THE WILLIAMS ALLOY PRODUCTS CO., ELYRIA, OHIO

PACKING-OY METALLIC PACKING

A PRODUCT OF BEARING-OY AND PISTON-OY

Manufacturers of Bearing-oy Bearing Metal, Piston-oy Piston Rings, Insulated Pistons, Packing-oy Metallic Packing, Lub-oy Oil-less Bearings, Shield-oy Metallic Lubricant.

No "bugs" in a carload of *these*

RUN of production or made to your specifications, Cleveland Cap Screws invite the closest scrutiny of your engineers or plant foreman. They're made right and shipped right.

Only on a production basis can such a high standard of accuracy be profitable, and only by use of special equipment and plant facilities can such production be held uniform. Cleveland Cap Screws are made by the Kaufman method—*patented*. They are the *best* cap screws we have ever made.

At our factory and warehouses are 20 *million* of these fine cap screws in a full list of sizes, S.A.E. and U.S.S. threads. Prompt shipments are the rule.

Cleveland Cap Screws are made by the Kaufman method, patented.

THE CLEVELAND CAP SCREW CO., 2921 E. 79th St., Cleveland, Ohio

Complete Warehouse Stocks At

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726 W. Washington Blvd.
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Ashton Bldg., 1547-51 University Ave.
Midway 2492; Nestor 1222

SAN FRANCISCO
The Cleveland Cap Screw Co.
548 Howard Street
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NEW YORK
The Cleveland Cap Screw Co.
47 Murray Street
Walker 1936 and 1732

LOS ANGELES
The Cleveland Cap Screw Co
224 East 11th Street
Westmore 9585

CLEVELAND
CAP SCREWS

Chosen for Condenser Tubes

Where other ferrous Tubes fail from rust and corrosion

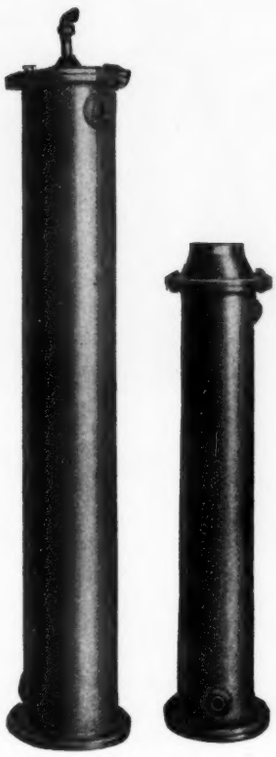
TONCAN COPPER
Molybdenum IRON

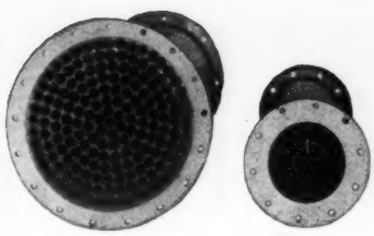
"BEFORE changing to Toncan Tubes we used tubes of (other ferrous materials) in our condensers, and in many parts of the country we found that the action of the water caused tube failures due to rust and corrosion."

The condenser tubes referred to are used in stills manufactured by the Bousman Manufacturing Company, Inc., Grand Rapids, Michigan, for re-distilling gasoline, kerosene and other cleaning solvents in dry cleaning plants, and manufacturing plants that use solvents for washing parts.

To overcome these costly tube failures, this company is now using condenser tubes of Seamless Toncan (copper-molybdenum) Iron.

Here, again, Toncan Iron was chosen because of its ability to successfully resist the corrosive media which cause early failure of other ferrous materials. For this reason, and because of the high strength and other advantages of seamless manufacture, Seamless Toncan Iron is being widely adopted for boiler tubes, power plant piping, water lines, and many other industrial applications both above and below ground.





Toncan Iron is made in Seamless pipe, sizes up to 5 in. I. P. S. and in seamless tubes, sizes up to 5½ in. O. D. If you will furnish us with particulars of your tube or piping problems, we will be glad to submit details relative to the suitability and advantages of Seamless Toncan Iron.

Toncan Iron, an exclusive product of Central Alloy Steel Corporation, is worked into seamless tubes and piping by the Babcock & Wilcox Tube Company.

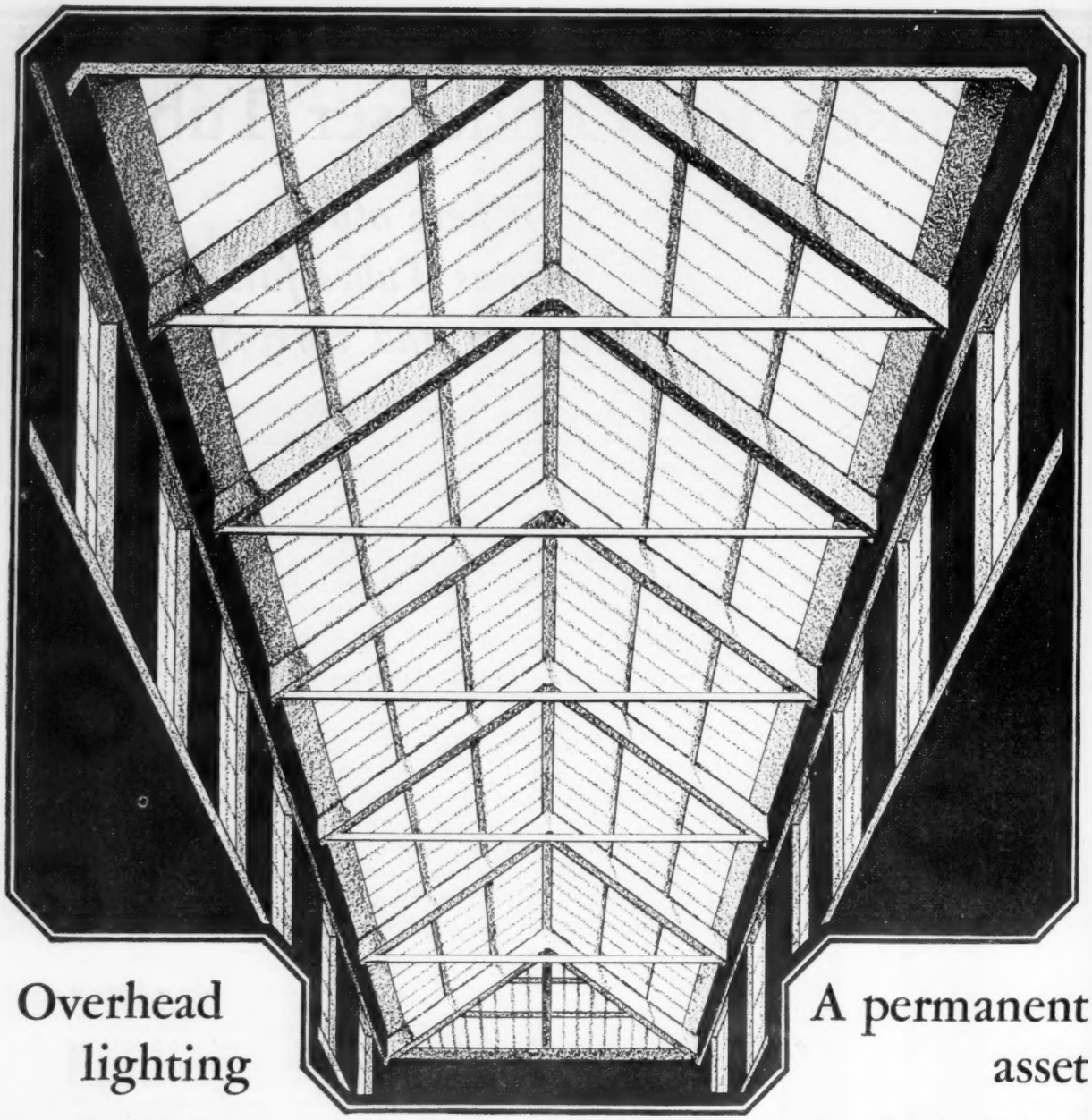
THE BABCOCK & WILCOX TUBE CO.

Works and General Offices: Beaver Falls, Pa.
General Sales Office: 85 Liberty Street, New York, N. Y.

Amarillo Atlanta Boston Chicago Cincinnati Cleveland Dallas Denver Detroit Galveston Houston Los Angeles New Orleans Philadelphia Phoenix Pittsburgh Portland Salt Lake City San Antonio San Francisco Seattle Havana Honolulu San Juan, Porto Rico

SEAMLESS TONCAN

TUBES PIPE



Overhead lighting

Here is another of the Lupton daylighting products — Lupton Rolled Steel Skylight.

You can economically apply this Skylight to any building, new or old. Thus your roof can be made to supply abundant daylight—the most productive illumination for every kind of work.

Erection of the Lupton Skylight is simple, as all parts are cut at the factory to fit and the whole can be assembled by ordinary mechanics.

Lupton makes steel windows for every type of building, and can supply your daylighting needs with windows which add permanent investment value to your property.

Daylight costs nothing— use plenty of it!

Provide for plenty of natural light in all buildings, new or old

A permanent asset

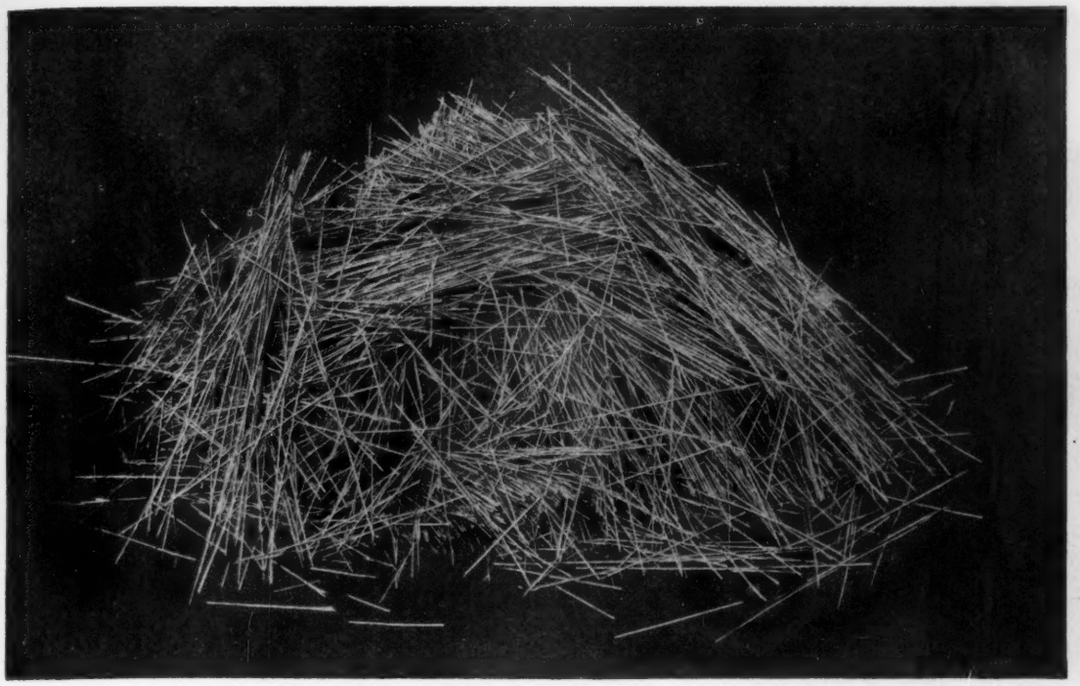
Lupton Rolled Steel Skylight, once erected, requires no more attention. It gives exceptionally long service under all conditions.

In Lupton Skylight the glass is supported between flexible strands of specially treated fibre which not only permit free expansion but prevent leakage. All exposed metal parts are of highest quality non-corrosive metal.

The result is a Skylight which is a permanent, trouble-free asset adapted to any type of construction. Write for detailed drawings showing typical installations.

DAVID LUPTON'S SONS COMPANY
2261 E. Allegheny Ave., Philadelphia

Lupton STEEL Skylights



This unretouched photograph shows the average run of turnings from the surface of a Birdsboro Chilled Roll. The length of the unbroken turnings measures from twelve to fourteen inches.

"----real uniformity!"

THIS remark is frequently made by experienced roll turners when finishing Birdsboro Chilled Rolls.

Unbroken turnings measuring twelve to fourteen inches in length prove tenacity and demonstrate freedom from foreign inclusions or imperfections—an assurance of Rolls that are ideal for plate mills handling material of light gauge where Rolls of exceptional strength are required.

Birdsboro Rolls come in Chilled, "Chiloy", Birdsboro Special Chills, Sand, "Sandloy", "Grainloy", Steel, Birdsboro Special Alloy Steel and "Durite". Write for complete data on Birdsboro Rolls.

BIRDSBORO
STEEL FOUNDRY AND MACHINE COMPANY
BIRDSBORO, PENNSYLVANIA
Designers and Builders

New York
90 West St.
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First Nat. Bank Bldg.
Chicago
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Washington, D. C.
Munsey Bldg.
Cleveland
National Building

There's a 2-way loss in making your own

THE Bolts and Nuts you make yourself (even on the most expensive modern machinery) always cost you more on a fair accounting than the bolts you buy. You can't compete with big volume production—you know where your own small competitors stand. *That's one way* you lose.

The second loss amounts to more money than the first. You can't make bolts and nuts as uniformly good as the Empire line. For the most modern bolt and nut making machinery you can buy won't thread your bolts to the uniform gauge-like accuracy of Empire New Process Bolts.

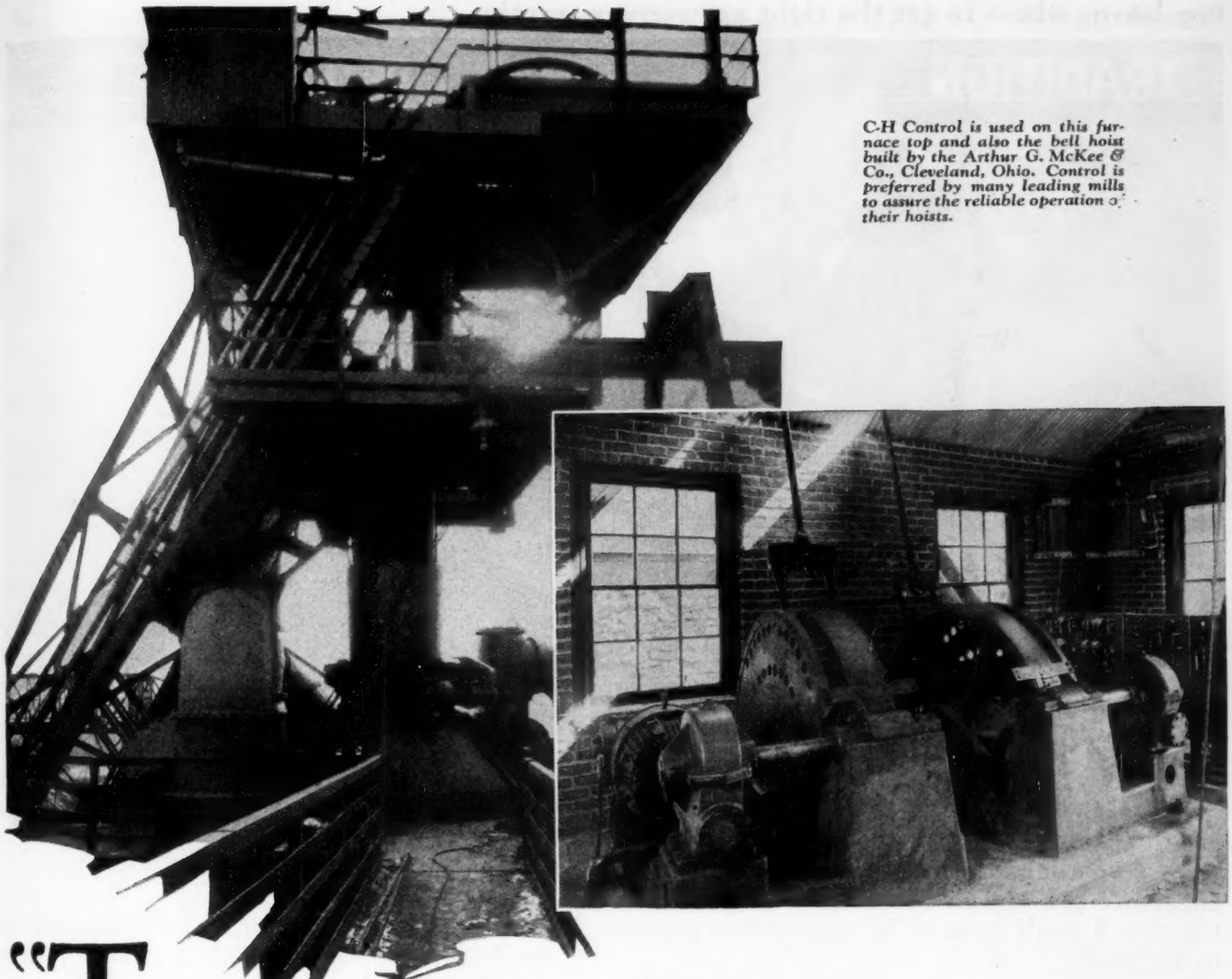
Where this saves big money is in assembly—accurate threading means clock-like progress in your assembly line—a big figure cut from assembly cost!

EMPIRE *New Process* BOLTS

RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY

Factories at PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

Sales Offices at Philadelphia, Chicago, Detroit, San Francisco, Los Angeles, Seattle, Portland



C-H Control is used on this furnace top and also the bell hoist built by the Arthur G. McKee & Co., Cleveland, Ohio. Control is preferred by many leading mills to assure the reliable operation of their hoists.

"Trial and Error" design won't do for Skip Hoist Control

EVERY hoist is special—different in the combination of load, speed, slope, or cycle of movements required. Overlooking or slighting any one of these individual factors when the Motor Control is designed, compromises the dependability and earning capacity of the hoist.

Since no hoist is exactly like the one *you* need, there is no chance for "trial and error" design. The basic design must be right the first time—and the *experience* of the Motor Control designer is your best guarantee.

Over 30 years experience stands behind the recommendations of C-H Engineers. During this long experience, C-H Engineers have met almost every individual problem of hoist Control—many times. Their success in designing hoist Control for leading plants is trustworthy proof that on your hoist, too, every factor will be considered—coordinated into Control which will be absolutely reliable.

A letter will enlist the cooperation of C-H Engineers—bring the results of 30 years experience to you.

The CUTLER-HAMMER Mfg. Co.

Pioneer Manufacturers of Electric Control Apparatus

1266 St. Paul Avenue, Milwaukee, Wis.

CUTLER HAMMER

The Control Equipment Good Electric Motors Deserve

Pop learns where to get the right answer—promptly.

"Here, Lad—

I wish you'd go up to the service station and find out whether my auto has been fixed up — I've called them up a half dozen times and can't get any satisfaction. The place is so big that I don't seem to be able to find anyone in authority."

"Sure, Pop—

but before I go and while that's hot in your mind let me say that it bears on the reason why I asked you to deal with Lincoln Electric Company on those welders we're thinking of buying.

When you call up or write them, your request falls smack into the hands of an executive who can *on his own authority* answer it.

The organization is just the right size to find the man you want without giving your life's secrets to the information clerk.

Whether your request is for prices, information, engineering, policy or what not, the request comes to the man whose say is final.

In other words, you get a square shot as opposed to a merry-go-round in the vicious circle."

The Lincoln "Stable-Arc" Welder

— welds easier
— makes better welds
— permits greater output

because of the steady uniform arc throughout entire welding range, which is the result of:

Variable voltage design
Laminated magnetic circuit
Separately-excited generator field
Double control of welding heat
All steel construction

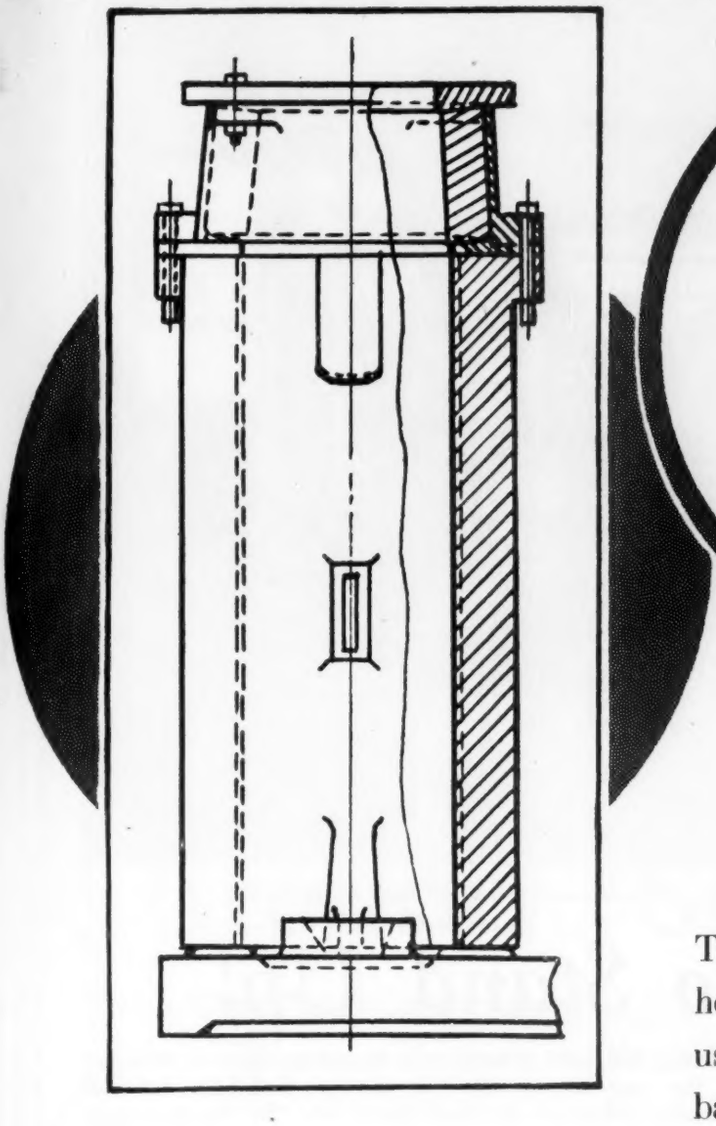
No other welder has all these features.

The Lincoln Electric Co.
Dept. No. 20-12, Cleveland, O.

W-68

LINCOLN "Stable-Arc" WELDER

No. Twenty-one of a series respecting the New "Valley" Ingot Mould



Thermally Balanced Rippled Narrow Taper

The new "Valley" semi-permanent hot top, especially designed for use with the rippled narrow taper balanced design ingot mould—

is so constructed and so efficient that the set-up will produce minimum crop and maximum yield.

The New "VALLEY" Ingot Mould

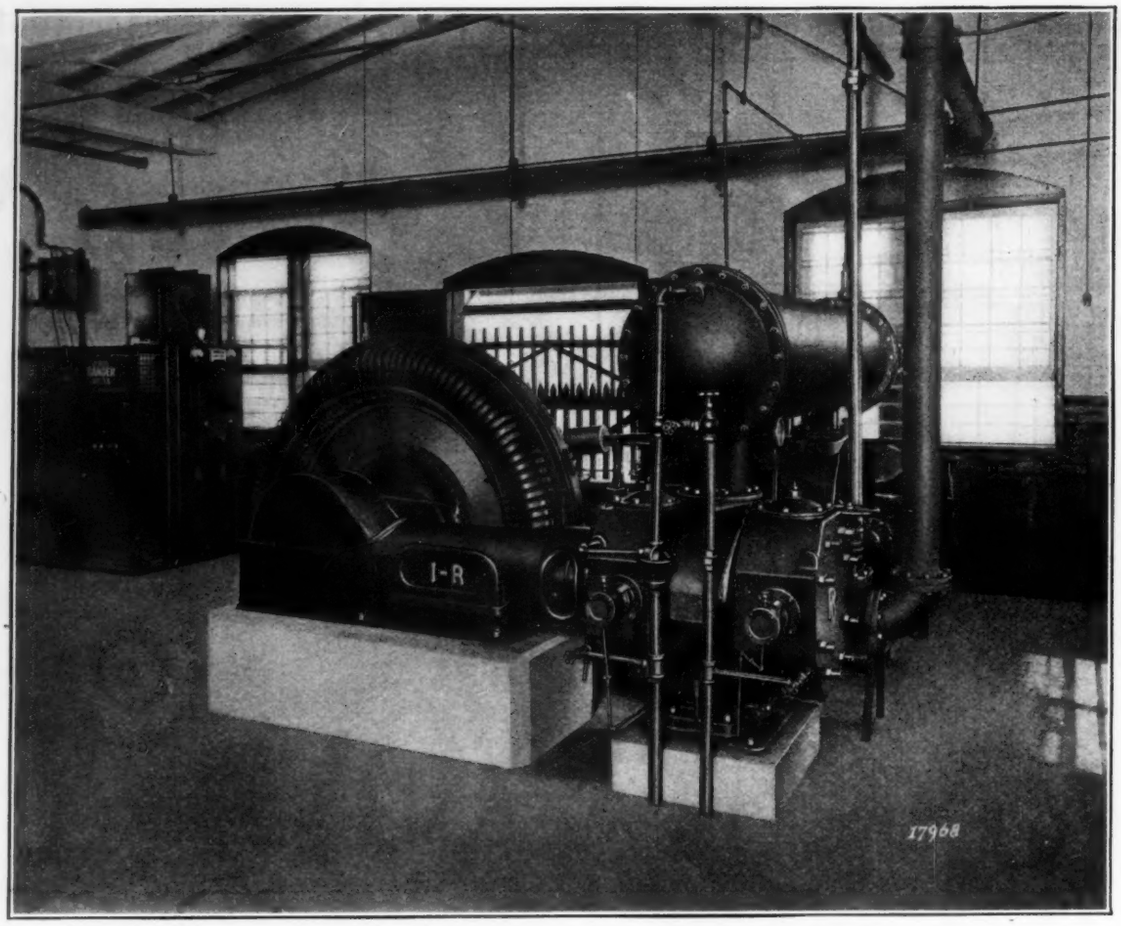
of patented design—for use with or without Hot Tops

Valley Mould & Iron Corporation

Main Office—Hubbard, Ohio

Western Office:
108 St. and Calumet River
South Chicago, Illinois

Plants:
Hubbard, Ohio
Sharpsville, Pa.
South Chicago, Ill.



A Class PRE-2 Direct-Connected, Synchronous-Motor-Driven Compressor

It Has to Stand Up!

In 1927, we sold a large air compressor to a Western railroad for use in its Denver shops. Recently an I-R representative asked a foreman there how the machine was standing up.

"It has to stand up," was the foreman's reply. "It supplies practically all our air, and things would stop moving if it went down on us."

Fortunately for this shop, the machine does stand up. Ingersoll-Rand Compressors are built to stand up, and users of compressed air have learned that they can safely rely upon them.

I-R Compressors and Pneumatic Tools have earned their reputation for dependability by many years of satisfactory service in railroad shops throughout the world.

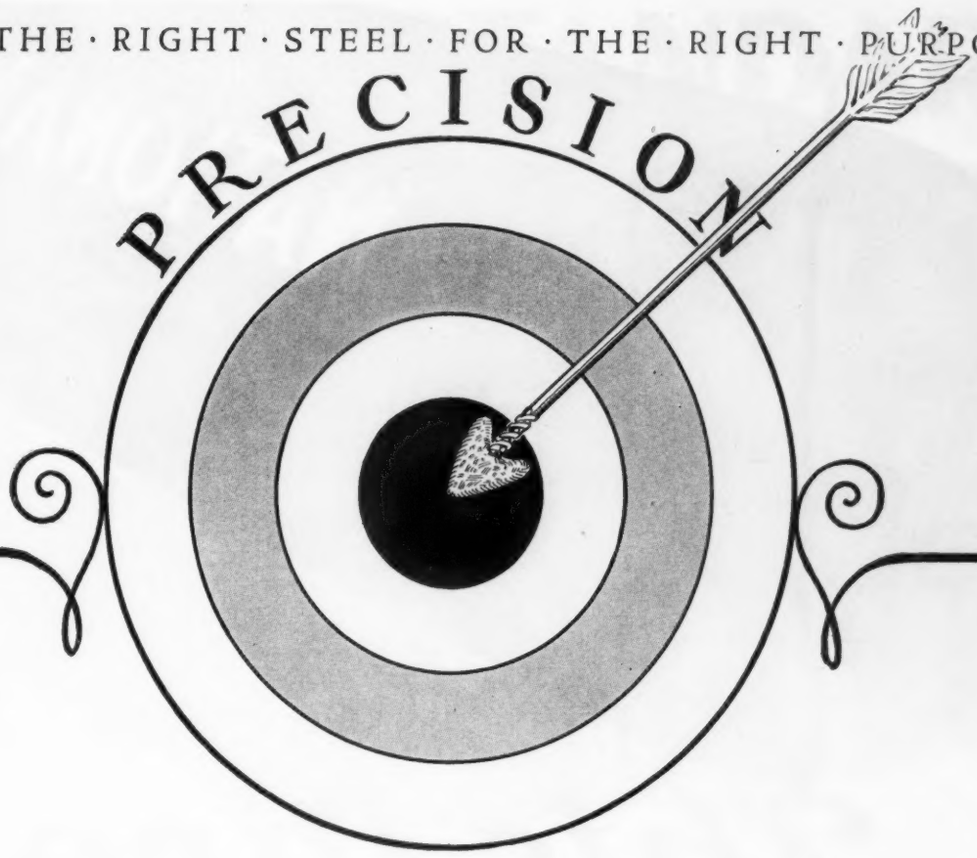
Ingersoll-Rand
furnishes a complete line of modern pneumatic tools for railroad shops

INGERSOLL-RAND COMPANY
11 Broadway - - - New York City
Offices in principal cities the world over
For Canada Refer—Canadian Ingersoll-Rand Co., Limited
10 Phillips Square, Montreal, Quebec

935-C

Ingersoll-Rand

USE · THE · RIGHT · STEEL · FOR · THE · RIGHT · PURPOSE



Ground Shafting

THE workmanship on Union Precision Shafting is typical of the finest craftsmanship in steel bar production. It is accurately straight, true to size and roundness, flawless in its bright polished surface and free from all strains.

Made in all grades of carbon and alloy steels and, when required, the bars are heat treated to specifications.

Union Precision Shafting is branded with our trade mark to identify it as a distinct product of this organization.

UNION DRAWN STEEL CO. - *Beaver Falls, Pa.*

UNION DRAWN STEELS

This Pipe Resists Corrosion

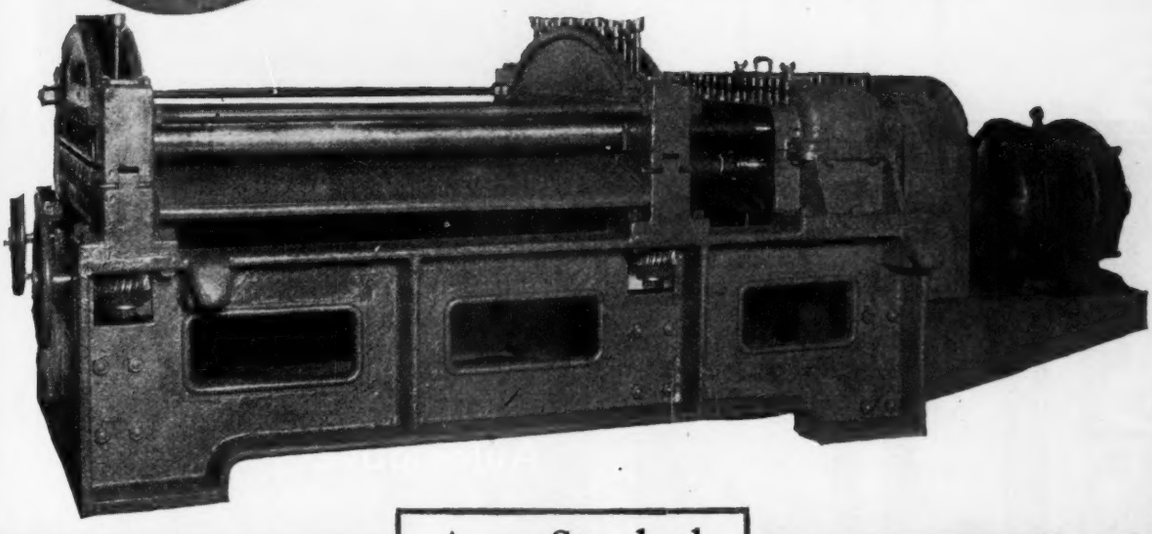
THE Scale Free Process, applied to "NATIONAL" Pipe, butt-weld sizes ½ to 3-inch, makes this pipe resistant to corrosion because it actually removes one of the principal causes of corrosion, namely, mill-scale. This scale, which forms on the skelp in the welding furnace, is electronegative to the pipe metal and sets up galvanic action, causing pitting around the scale areas. Therefore, the scale being eliminated, the finished pipe is highly resistant to that form of corrosion known as "pitting" and insures added years of life to your pipe lines. "NATIONAL" Scale Free Pipe means, not only minimized corrosion because of elimination of scale, but no damage to valve seats and no clogging of small lines or small orifices by loose scale. The additional rolling which scale free pipe receives increases the strength at the weld about 20 per cent, making it especially desirable for bending, coiling and special uses.

This Scale Free Process, like the Spellerizing Process, is a patented feature, developed by National Tube Company—the details of which are given in Bulletin No. 7. A copy will be sent on request.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

District Sales Offices in The Larger Cities

AETNA-STANDARD



Aetna-Standard
Roller Leveller

The Aetna-Standard Roller Leveller is used for levelling full-finished, galvanized and common black sheets, and strip steel, either for hot or cold work.

Machine tool design and construction incorporated in this leveller make it practically free of maintenance under the most severe service.

Rolls for these levellers can be furnished with any degree of hardness necessary for any particular application.

Our representative will gladly explain to you the many other features of this Aetna-Standard product which is giving day-in-and-day-out service in many of the largest steel mills in this country and abroad.

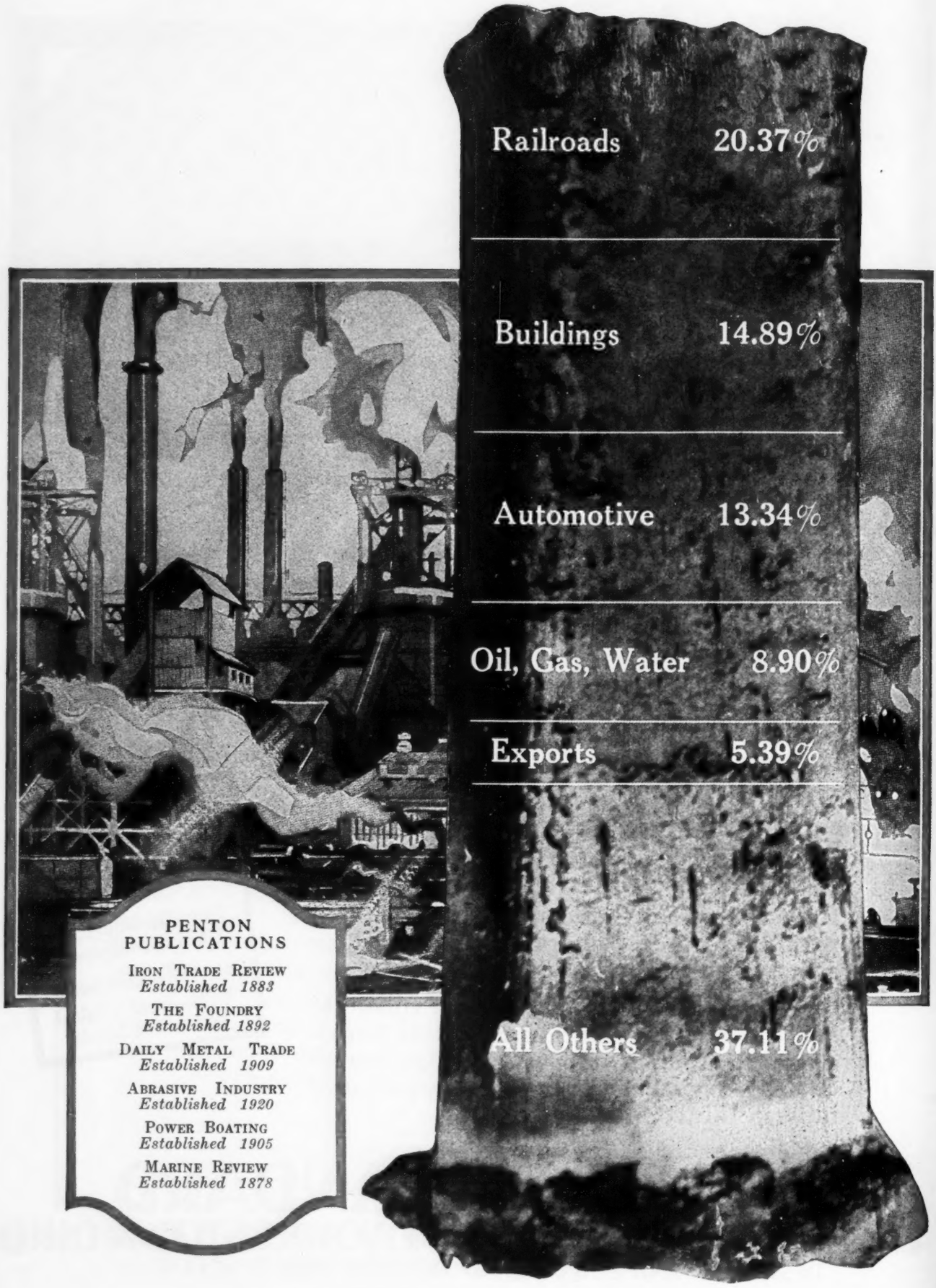
Products

Tube and Pipe Mills
Tin, Strip and Sheet Mills
Bar Mills
Pipe Threading and Cutting Machinery
Draw Benches
Rolls—Sand, Chilled and ASEX Special

The AETNA-STANDARD ENGINEERING COMPANY·YOUNGSTOWN·OHIO

DESIGNERS AND BUILDERS OF ROLLING MILL MACHINERY

How a Business Paper Won



Von

Authority in Its Industry

From Pins to Ingots—A Census of Steel Distribution

MILLIONS of tons! Plates! Bars! Wire! Pipe! Where did they go? Nobody knew. Records of the great steel producers indicated in a vague way the kinds of steel used by their customers, but the actual amounts consumed by the different industrial groups were guessed at. There were no statistics of steel consumption. Railroads were recognized as among the largest buyers. According to tradition, when the railroads expanded, steel needs were enlarged. But there came a time when although the carriers reduced expenditures the demand for steel increased. What had happened? Had automobiles usurped the center of the stage to carry forward American industrial life, and with it the steel industry, to new heights?

What was the effect of these and other new forces on the steel industry? Nobody knew. Conjecture and unsupported opinion were all that were offered. What effect, translated into steel products, had the great building construction program following the accumulated war shortage? No acceptable answers were available.

Ever searching for some new method of serving its great clientele, *Iron Trade Review* set about the task of supplying answers to these questions. A study was made of the type of information desired, of the classifications of products most important, and of the fundamental phases of consumption. With the co-operation of several of the great steel producing organizations, *Iron Trade Review*, January 5, 1922, presented its initial survey of finished steel consumption, according to major products and industries. It was the first census of distribution for steel. Once again *Iron Trade Review* pioneered a great service to all industry.

In the survey for the year 1927, published January 5, 1928, 111 of the leading steel manufacturers, representing 94.89 per cent of the steel-ingot capacity of the United States, supplied information for this now thoroughly developed annual analysis.

Thus it has been possible to ascertain that in 1927, 20.37 per cent of all finished steel produced went to railroads; 14.89 per cent to buildings; 13.34 per cent to the automotive industry; 8.90 per cent to oil, gas and water requirements; and 5.39 per cent to exports, leaving 37.11 per cent for miscellaneous consumption. Even the miscellaneous item has been divided into a number of additional classifications.

The service rendered by *Iron Trade Review* to the metalworking industries in making available this authentic and valuable information is characteristic of the progress and pioneering which has made this publication the recognized authority of industry.

The Penton Press
A modern publication printing plant equipped to produce newspapers, business papers, magazines, books, catalogs, etc.

IRON TRADE REVIEW
Every week on Thursday
A Penton Publication
Penton Building Cleveland, Ohio

Member of
The Audit Bureau of Circulations; the Associated Business Papers, Incorporated; and the National Publishers' Association.
149X

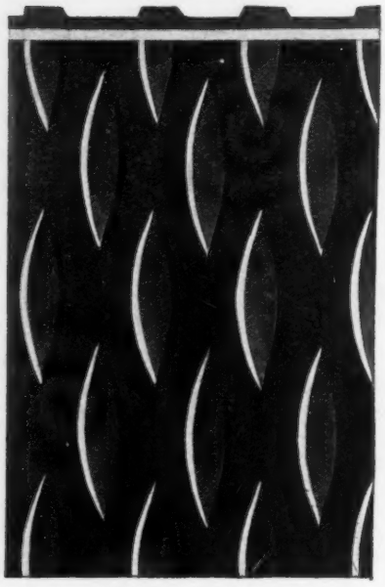
HERE IT IS!

No. 16 gauge

"A. W." Diamondette Rolled Steel Floor Plates

First No. 14 and No. 12
Now No. 16 Gauge

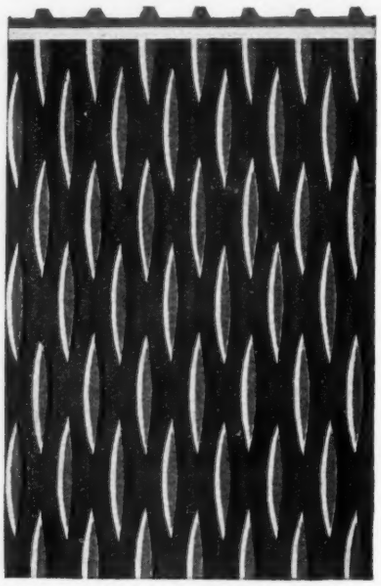
STANDARD
"A. W." DIAMOND
(one-half size)



For general structural purposes, including all forms of Step, Flooring, Platform, and Runway Construction.

Thickness.....⅛" to 1"
Width.....72" maximum
Length.....25' maximum

"A. W."
DIAMONDETTE
(one-half size)



Unequaled for Automobile Running Boards, Foot Boards, Flooring, Platforms, Walkways, etc., where raised anti-slip surface is required without necessity for supporting strength.

No. 16, 14, and 12 gauge
(Exclusive of Pattern)
Maximum Sizes
No. 12 and No. 14 { 24" x 192" or 36" x 144"
No. 16 — 30" x 96"

"A. W." Products

"SWEDE" PIG IRON
Basic and All
Foundry Grades

BILLETS
BLOOMS
SLABS
SHEARED
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BLUE ANNEALED
STEEL SHEETS
ROLLED STEEL
FLOOR PLATES

ALAN WOOD IRON & STEEL CO. ESTABLISHED 1826 "A.W." TRADE MARK PHILADELPHIA

FLOOR PLATES

for all purposes

Samples and all Engineering Information on Request

ALAN WOOD IRON AND STEEL CO.

Widener Building, Philadelphia, Pa.

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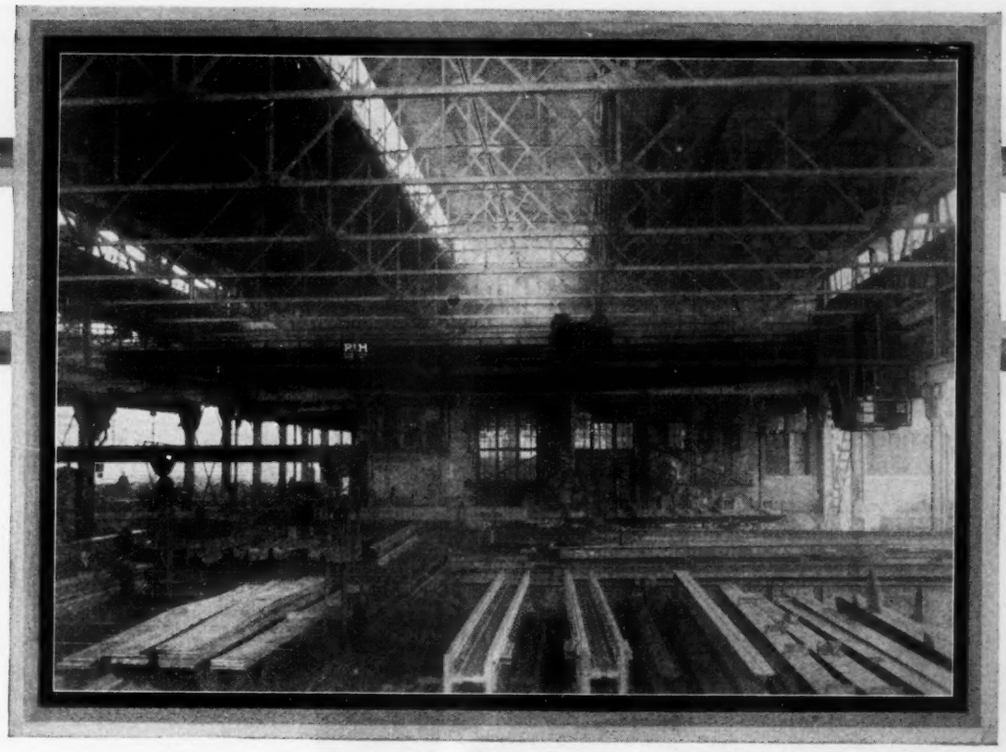

93 P&H Cranes in use at this *steel plant

Like most large users of P&H Cranes, this plant's experience goes back about 30 years. They bought their first P&H in 1901, have been buying them ever since .... and all are still giving dependable, low cost service.

Every part in a P & H Traveling Crane is made in our plant, and to the highest possible standards. A P&H Crane is not cheap, yet because of large scale production .... over 9,000 are in use .... a P&H costs but little more.

*The name of this corporation, the names of scores of other large P&H users, and Bulletin 408R, gladly sent on request.

HARNISCHFEGER CORPORATION

Established in 1884

Crane and Hoist Division

3811 National Avenue, Milwaukee, Wisconsin

New York *Atlanta* *San Francisco* *Detroit* *Pittsburgh* *Boston*
Philadelphia *Chicago* *Indianapolis* *Dallas* *Portland* *St. Louis*
Birmingham *Kansas City* *Charlotte* *Baltimore* *Memphis* *Seattle*
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CRANES **P&H** HOISTS

7934

STEEL—Ready to Ship

No waiting—no delay—'phone, wire or mail your orders to the nearest Ryerson Plant and the steel will be on its way to you within twenty-four hours.

We have the steel, thousands of tons of it—all kinds, shapes and sizes together with the most complete facilities for cutting to length and shipping, whether by railroad, truck or airplane express.

No order is too small for personal attention nor too large for prompt shipment.

Bars	Turnbuckles	Wire	Firmtread Plates
Shapes	Babbitt	Chain	Alloy Steel
Structurals	Plates	Refined Iron	Tool Steel
Rails	Sheets	Reinforcing Steel	Ascoloy
Shafting	Rivets	Boiler Tubes and Fittings	Small Tools
Strip Steel	Allegheny Metal		Machinery, etc.

JOSEPH T. RYERSON & SON INC.

Plants: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Jersey City

Representation in: Minneapolis, Tulsa, Newark, New York, Denver, Los Angeles, San Francisco

RYERSON

STEEL-SERVICE

Model 24-P ejection type press, having box 100" long, 20" wide 42" deep. Finished bales measure 20" x 14" x 14" minimum. Can be equipped with power operated loading hopper.

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Norton Co., Worcester, Mass.

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Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE (Dissolved)
International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACETYLENE GENERATORS
Air Reduction Sales Co., 342 Madison Ave., New York City.
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International Oxygen Co., Newark, N. J.
Prest-O-Lite Co., The, 30 E. 42nd St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

ADAMITE ROLLS
American Adamite Co., The, 410 Oliver Bldg., Pittsburgh, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM
Aluminum Co. of America, 2408 Oliver Bldg., Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Pa.

ALUMINUM (Vanadium)
Vanadium Corp. of America, 120 Broadway, New York City.

ALUMINUM BRONZE (Acid Resisting)
Duriron Co., Inc., The, Dayton, Ohio.

ANGLES, TEES, CHANNELS—See STEEL (Structural)

ANNEALING BOXES
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Petroleum Iron Works Co., The, Sharon, Pa.
Smith, George H., Steel Casting Co., Milwaukee, Wis.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh.

ANVILS (Cast Steel)
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

APPRAISALS
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

ARCHES (Suspended)
Detrick, M. H., Co., 140 S. Dearborn St., Chicago, Ill.

ARCHITECTS (Industrial)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Champion Machine & Forging Co., 3675 E. 78th St., Cleveland.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Williams Alloy Products Co., The, Elyria, Ohio.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BANDS (Iron)
Bethlehem Steel Co., Bethlehem, Pa.

BANDS AND HOOPS (Galvanized Strips)
Sharon Steel Hoop Co., Sharon, Pa.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., 71 Broadway, New York City.

BARRELS (Steel)
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

BARS (Alloy)
Central Alloy Steel Corp., Massillon, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.

BARS (Concrete Reinforcing)
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Nicetown Plate Washer Co., Inc., Juaniata & Clarissa Sts., Nicetown, Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Pacific Coast Steel Co., Hunter-Dulin Bldg., San Francisco, Calif.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Phoenix Iron Co., The, 20 So. 15th, Philadelphia, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

BEARING METAL
Williams Alloy Products Co., The, Elyria, Ohio.

BEARINGS (Ball)
New Departure Mfg. Co., The, Bristol, Conn.
Norma-Hoffman Bearings Corp., Stamford, Conn.

BEARINGS (Journal)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Hyatt Roller Bearing Co., Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.
Williams Alloy Products Co., The, Elyria, Ohio.

BEARINGS (Motor)
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearings Corp., Stamford, Conn.

BEARINGS (Roller)
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearings Corp., Stamford, Conn.

BEARINGS (Tapered Roller)
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Norma-Hoffman Bearings Corp., Stamford, Conn.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS AND BUSHINGS (Brass and Bronze)
Erie Bronze Co., 402 W. 19th St., Erie, Pa.
Williams Alloy Products Co., The, Elyria, Ohio.

BENCH LEGS (Steel)
Lupton's, David, Sons Co., 2225 Allegheny St., Philadelphia, Pa.

BENDING AND STRAIGHTENING MACHINES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hinman, D. A., & Co., Sandwich, Ill.
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Long & Allstatter Co., Hamilton, O.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh, Pa.

BILLETS (Alloy and Carbon Steel)
Central Alloy Steel Corp., Massillon, O.
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Die Stock Steel)
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.

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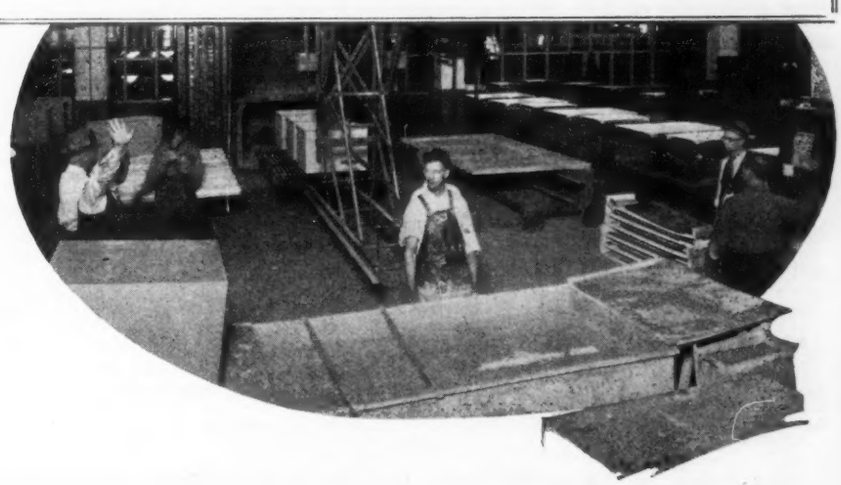

BILLETS (Forging)
Bethlehem Steel Co., Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, O.
Erie Forge Co., Erie, Pa.
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.
Heppenstall Forge & Knife Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

BILLETS (Forging, Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.

BILLETS (Re-Rolling)
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.

BILLETS AND BLOOMS
Bethlehem Steel Co., Bethlehem, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Illinois Steel Co., 208 South La Salle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

BILLETS AND SLABS
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.

BLAST FURNACES — See FURNACES (Blast)

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, Ohio.

BLOW PIPES (Brazing, Welding, Cutting, Etc.)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER SETTINGS & CHIMNEYS
Detrick, M. H., Co., 140 S. Dearborn St., Chicago, Ill.
Rust Engineering Co., American Bank Bldg., Pittsburgh, Pa.

BOILER TUBES — See TUBES (Boiler)

BOILER WALL COATING
Celite Products Co., 1320 So. Hope St., Los Angeles, Calif.

BOILERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Combustion Engineering Corp., 200 Madison Ave., New York City.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.

BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Clark Bros. Bolt Co., Milldale, Conn.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Kirk-Latty Co., 1971 W. 85th St., Cleveland, O.
Lake Erie Bolt & Nut Co., 915 E. 63rd St., Cleveland, O.
Lamson & Sessions Co., The, 2188 Scranton Rd., Cleveland, O.
Michigan Screw Co., S. Hosmer Ave., Lansing, Mich.
Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, Ohio.
Rockford Bolt Co., 220 Mill St., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

BOLTS & NUTS (Brass & Bronze)
Lamson & Sessions Co., The, 2188 Scranton Rd., Cleveland, O.

BOOKS (Technical)
Penton Publishing Co., Cleveland, O.

BORING MACHINES (Horizontal)
Diamond Clamp & Flask Co., Richmond, Ind.

BORING MILLS
Shaw Crane-Putnam Mach. Co., 100 E. 42nd St., New York.

BOXES (Carbonizing)
Farrell-Cheek Steel Foundry Co., Sandusky, O.

BOXES (Open Hearth Charging)
Strong Steel Foundry Co., 33 Norris St., Buffalo, N. Y.

BOXES (Steel)
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

BRAKES (Crane)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland.

BRAKES (Electric)
Cutler-Hammer Mfg. Co., The, Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

BRASS
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh, Pa.

BRICK (Silica, Magnesia, Chrome, Fire Clay)
General Refractories Co., 106 S. 16th St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Farmers Bk Bldg., Pittsburgh.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Stowe-Fuller Refractories Co., 1659 Union Trust Bldg., Cleveland, O.
U. S. Refractories Corp., Mt. Union, Pa.

BRICK (Insulating) — See INSULATING BRICK

BRIDGE CRANES (Ore and Coal Handling)
Wellman-Seaver-Morgan Co., The, 7025 Central Ave., Cleveland, O.

BRIDGES, BUILDINGS, VIADUCTS, STACKS (Steel)
American Bridge Co., 71 Broadway, New York City.
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Belmont Iron Works, 22nd and Washington Ave., Philadelphia.
Eichleay, John, Jr., Co., S. 20th and Wharton, Pittsburgh, Pa.
McClintic-Marshall Co., Oliver Bldg., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, Ohio.
Mt. Vernon Bridge Co., Mt. Vernon, Ohio.
Phoenix Bridge Co., 20 S. 15th St., Philadelphia, Pa.
Steel Plate Products Co., Pottstown, Pa.

BRONZE (Centrifugally Cast)
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.

BRONZE (Manganese)
Bethlehem Steel Co., Bethlehem, Pa.

BUCKETS (Clam Shell)
Blaw-Knox Co., 602 Farmers Bk Bldg., Pittsburgh
Brosius, Edgar E., Sharpsburg P. O., Pittsburgh, Pa.
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., 4403 St. Clair Ave., Cleveland, O.
Owen Bucket Co., The, 6013 Breakwater Ave., Cleveland.
Williams, G. H., Co., 611 Haybarger Lane, Erie, Pa.

BUCKETS (Dragline)
Blaw-Knox Co., 602 Farmers Bk. Bldg., Pittsburgh

BUCKETS (Dumping)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O.

BUCKETS (Elevator)
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.

BUILDINGS (Industrial)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Blaw-Knox Co., 602 Farmers Bk. Bldg., Pittsburgh

BUILDINGS (Steel)—See BRIDGES BUILDINGS, VIADUCTS, STACKS (Steel)

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Long & Allstatter Co., Hamilton, O.

BURNERS (Acetylene) — See TORCHES AND BLOWERS (Acetylene, Blow, Oxy-Acetylene)

BURNERS (Automatically Regulated)
American Heat Economy Bureau, Inc., Wabash Bldg., Pittsburgh, Pa.

BURNERS (Fuel, Oil, Gas, Combination)
Babcock & Wilcox Co., 85 Liberty St., New York City.
Strong, Carlisle & Hammond Co., The, 1392 W. 3rd St., Cleveland, Ohio.
Surface Combustion Co., 2375 Dorr St., Toledo, Ohio.

BY-PRODUCT PLANTS
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh.

CALLING SYSTEMS
National Scale Co., Chicopee Falls, Mass.

CAN MAKING MACHINERY
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.

CAP SCREWS
Cleveland Cap Screw Co., The, 2921 E. 79th St., Cleveland, Ohio.

CARBON BURNING APPARATUS
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

CAR DUMPERS
Wellman-Seaver-Morgan Co., The, 7025 Central Ave., Cleveland, O.

CAR PULLERS (Electric Capstan)
Sprague Electric Hoist Division of The Shepard Electric Crane & Hoist Co., 30 Church St., New York City.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.

CARS (Ingot and Open Hearth Charging)
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

CASTINGS (Acid Resisting)
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS (Acid Resisting—Brass, Bronze and Aluminum)
Cadman, A. W., Mfg. Co., 2810 Smallman St., Pittsburgh, Pa.

CASTINGS (Alloy Steel)
Babcock & Wilcox Tube Co., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Chicago Steel Foundry Co., Kedzie Ave. and 37th St., Chicago.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Industrial Steel Casting Co., Toledo, O.
National Alloy Steel Co., Blawnox, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Treadwell Engineering Co., Easton, Pa.
Union Steel Castings Co., 62nd and Butler Sts., Pittsburgh, Pa.

CASTINGS (Bessemer Iron)
Valley Mould & Iron Corp., Hubbard, Ohio.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Erie Bronze Co., 402 W. 19th St., Erie, Pa.
Enterprise Brass Works, Muskegon, Mich.
General Bronze Co., 3216 Smallman St., Pittsburgh.
Hill-Wallisch Bronze Co., 32nd and Smallman Sts., Pittsburgh, Pa.

CASTINGS (Die) See DIE CASTINGS

CASTINGS (Electric Steel)
Chicago Steel Foundry Co., Kedzie Ave. & 37th St., Chicago, Ill.
Crucible Steel Castings Co., The, Almira and W. 84th St., Cleveland, O.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Industrial Steel Casting Co., Toledo, O.
Maynard Electric Steel Castings Co., 2-12 Kilbourn Rd., Milwaukee, Wis.
Pittsburgh Electric Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Sivyer Steel Castings Co., Milwaukee, Wis.
West Steel Castings Co., The, 805 E. 70th St., Cleveland, O.

CASTINGS (Gray Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Cascade Foundry Co., 19th & Plum Sts., Erie, Pa.
Forest City-Walworth Run Foundries, W. 27th & Nickel Plate R. R., Cleveland, Ohio.
Lake Shore Engine Works, Marquette, Mich.
Marietta Hollow-Ware & Enameling Co., The, Marietta, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Treadwell Engineering Co., Easton, Pa.

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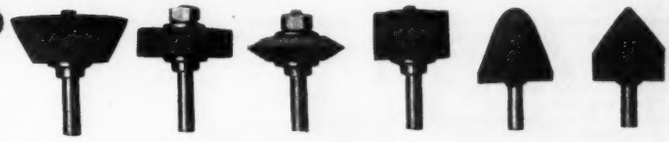

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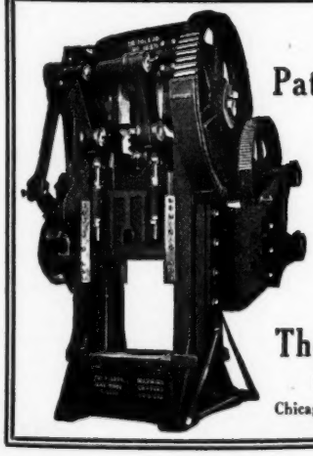
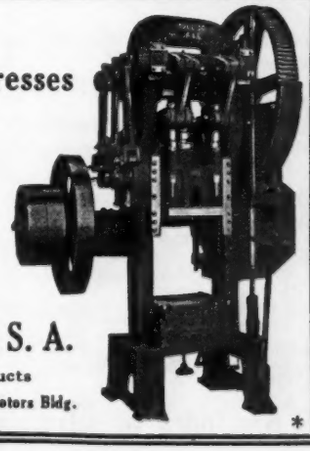
Chicago Office: 549 West Washington Blvd Detroit Office: Room 3—250 General Motors Bldg.





CASTINGS (Malleable)
Iowa Malleable Iron Co., Fairfield, Iowa.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Meeker Foundry Co., Clay & Ogden Sts., Newark, N. J.
Peoria Malleable Castings Co., Peoria, Ill.
Vermilion Malleable Iron Co., Hoopeston, Ill.

CASTINGS (Nickel Chromium)
Chicago Steel Foundry Co., Kedzie Ave. and 37th St., Chicago, Ill.

CASTINGS (Steel)
American Adamite Co., The, 410 Oliver Bldg., Pittsburgh, Pa.
American Steel Foundries, 410 No. Michigan Ave., Chicago, Ill.
Atlas Steel Castings Co., 1963 Elmwood ave., Buffalo, N. Y.
Bethlehem Steel Co. Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Chicago Steel Foundry Co., Kedzie Ave. and 37th St., Chicago, Ill.
Columbia Steel Corp., Balfour Bldg., San Francisco, Calif.
Commercial Steel Castings Co., The, Marion, O.
Crucible Steel Castings Co., The, Almira and W. 84th St., Cleveland, O.
Erie Forge Co., Erie, Pa.
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Industrial Steel Casting Co., Toledo, O.
Maynard Electric Steel Castings Co., 2-12 Kilbourn Rd., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Alloy Steel Co., Blawnox, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Reliance Steel Casting Co., 28th & Smallman Sts., Pittsburgh, Pa.
Sharon Foundry Co., Sharon, Pa.
Sivyer Steel Casting Co., Milwaukee, Wis.
Smith, George H., Steel Casting Co., Milwaukee, Wis.
Strong Steel Foundry Co., 33 Norris St., Buffalo, N. Y.
Treadwell Engineering Co., Easton, Pa.
Union Steel Castings Co., 62nd and Butler Sts., Pittsburgh, Pa.
West Steel Castings Co., The, 805 E. 70th St., Cleveland, O.

CASTINGS (Worm & Gear Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CASTORS (Plate Mills)—See PLATE CASTORS

CEMENT (High Temperature)
General Refractories Co., 106 S. 16th St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Farmers Bk. Bldg., Pittsburgh.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

CENTRAL STATION EQUIPMENT
General Electric Co., Schenectady, N. Y.

CHAIN-MAKING MACHINERY
Nilson, A. H., Machine Co., Bridgeport, Conn.

CHAINS (Crane and Hoist)
American Chain Co., Bridgeport, Conn.
Carroll Chain Co., The, 265 Hosack St., Columbus, O.

CHAINS (For Drives, Conveyors & Elevators)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

CHAINS FOR ALL PURPOSES
American Chain Co., Bridgeport, Conn.
Carroll Chain Co., The, 265 Hosack St., Columbus, O.

CHAPLETS
Erdle Perforating Co., 171 York St., Rochester, N. Y.

CHARCOAL
Hillman Coal & Coke Co., First National Bank Bldg., Pittsburgh, Pa.

CHARGING MACHINES (Cupola)
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

CHEMICALS
American Chemical Paint Co., Ambler, Pa.
Ford, The J. B., Co., Wyandotte, Mich.
Vanadium Corp. of America, 120 Broadway, New York.

CHISEL BLANKS
Hunter Saw & Machine Co., 5656 Butler St., Pittsburgh, Pa.

CHROME ORE
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CHUCKING MACHINES (Automatic, Multiple Spindle)
National Acme Co., E. 131st St. and Coit Rd. Cleveland, O.

CLAMPS (Plate Lifting)
Mirkil, H. Hays, 1011 Chestnut St., Philadelphia, Pa.

CLASSIFIERS
Dorr Company, 247 Park Ave., New York City.

CLEANERS (Metal)—See METAL CLEANERS

CLEANING SPECIALTIES
American Chemical Paint Co., Ambler, Pa.
Ford, The J. B., Co., Wyandotte, Mich.

CLEVISES
Cleveland City Forge Co., 45th and Lakeside Aves., Cleveland, O.

CLUTCH CONES
Transue & Williams Steel Forging Corp., Alliance, O.

CLUTCHES
Johnson, Carlyle, Machine Co., The, Manchester, Conn.

CLUTCHES (Cut-Off Coupling)
Johnson, Carlyle, Machine Co., The, Manchester, Conn.

CLUTCHES (Friction)
Johnson, Carlyle, Machine Co., The, Manchester, Conn.
Jones, W. A., Foundry & Machine Co., 4437 W. Roosevelt Ave., Chicago, Ill.

COAL AND COKE
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Eaton, Rhodes & Co., First National Bank Bldg., Cincinnati, O.
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.
Hillman Coal & Coke Co., First National Bank Bldg., Pittsburgh, Pa.
Park & Williams, Real Estate Trust Bldg., Philadelphia, Pa.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Pilling & Co., Inc., 1500 Chestnut St., Philadelphia, Pa.
Pittsburgh Coal Co., Oliver Bldg., Pittsburgh, Pa.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York City.
Snyder, W. P., Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

COAL CRUSHERS AND PULVERIZERS
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.

COAL, ORE and ASH HANDLING MACHINERY
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Industrial Brownhoist Corp., 4403 St. Clair Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Sprague Electric Hoist Division of The Shepard Electric Crane & Hoist Co., 30 Church St., New York City.

COKE—See COAL AND COKE

COKE OVENS (By-Product)
Foundation Oven Corp., 120 Liberty St., New York City.
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh, Pa.

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O.
Wellman-Seaver-Morgan Co., The, 7025 Central Ave., Cleveland, O.

COKE QUENCHING SYSTEMS
Dry Quenching Equipment Corp., 200 Madison Ave., New York City.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.

COMPOUNDS (Metal Cleaning)
Parkin, Wm. M., Co., 1005 Highland Bldg, Pittsburgh, Pa

COMPOUNDS (Pickling)
Parkin, Wm M., Co., 1005 Highland Bldg., Pittsburgh, Pa.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City
Sullivan Machinery Co., 78 E. Adams St, Chicago, Ill.

COMPRESSORS (Portable)
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co, 11 Broadway, New York City

CONCRETE FLOOR SLABS
American Cement Tile Mfg. Co., Oliver Bldg., Pittsburgh, Pa

CONCRETE MIXERS — See MIXERS (Concrete)

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONCRETE ROOFING TILE
American Cement Tile Mfg Co., Oliver Bldg., Pittsburgh, Pa

CONCRETE WATERPROOFING
Celite Products Co., 1320 S. Hope St., Los Angeles, Calif.

CONDENSERS (Surface, Barometric, Multi-Jet)
Ingersoll-Rand Co., 11 Broadway, New York City.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., Youngstown, O.

CONNECTING RODS
Transue & Williams Steel Forging Corp., Alliance, O.

CONSTRUCTION (Industrial Buildings)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROLLERS (Automatic)
Electric Controller & Mfg. Co. The, 2698 E. 79th, Cleveland, O.

CONTROLLERS (Electric)
Cutler-Hammer Mfg. Co., The, Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.

CONTROLS (Open Hearth Furnace)
Morgan Construction Co., Worcester, Mass.

CONVEYORS (Elevating and Conveying)
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Industrial Brownhoist Corp., 4403 St Clair Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

COPPER (Phosphor)
General Bronze Co., 3212 Smallman St., Pittsburgh, Pa.

COTTER PINS
Hindley Mfg. Co., John St., Valley Falls, R. I.

COTTERS
Kirk-Latty Co., 1971 W. 85th St., Cleveland, O.
Lamson & Sessions Co., The, 2188 Scranton Rd., Cleveland, O.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

COUPLINGS (Flexible)
Electric Controller & Mfg. Co., The 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.

CRANES
Bedford Foundry & Machine Co., Bedford, Ind.
Cyclops Iron Works, 837 Folsom St., San Francisco, Calif.
Milwaukee Electric Crane & Mfg. Co., Milwaukee, Wis.
Shaw Crane-Putnam Mach. Co., 100 E. 42nd St., New York City.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Charging)
Alliance Machine Co., The, Alliance, O.
Morgan Engineering Co., Alliance, O.

CRANES (Creeper, Erection)
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., 4403 St. Clair Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

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Alliance Machine Co., The, Alliance, O.
Box Crane & Hoist Corp., Janney and E. Ontario Sts., Philadelphia.
Cleveland Crane & Engrg. Co., The, Wickliffe, O.
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reliance Machinery Co., 1411 Brighton Rd., Pittsburgh, Pa.
Roeper Crane & Hoist Works, 1729 No. 10th St., Reading, Pa.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gantry)
Bedford Foundry & Machine Co., Bedford, Ind.
Cleveland Crane & Engineering Co., The, Wickliffe, O.

CRANES (Hand)
Box Crane & Hoist Corp., Janney and E. Ontario Sts., Philadelphia.
Cleveland Electric Tramrail, Division of the Cleveland Crane & Engineering Co., Wickliffe, O.
Roeper Crane & Hoist Works, 1729 No. 10th St., Reading, Pa.

CRANES (Hand Traveling)
Box Crane & Hoist Corp., Janney and E. Ontario Sts., Philadelphia.

CRANES (Hydraulic)
Alliance Machine Co., The, Alliance, O.

CRANES (Jib)
Box Crane & Hoist Corp. Janney & E. Ontario Sts., Philadelphia,
Cleveland Electric Tramrail, Division of the Cleveland Crane & Engineering Co., Wickliffe, O.

CRANES (Locomotive)
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., 4403 St. Clair Ave., Cleveland, O.

CRANES (Portable)
Beatty Machine & Mfg. Co., Hammond, Ind.

CRANK SHAFTS
Champion Machine & Forging Co., 3675 E. 78th St., Cleveland.
Transue & Williams Steel Forging Corp., Alliance, O.

CRUSHING, GRINDING AND PULVERIZING MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Fuller Lehigh Co., Fullerton, Pa.
Morgan Engineering Co., Alliance, O.

CUPRO-VANADIUM
Vanadium Corp. of America, 120 Broadway, New York City.

CUTTING AND WELDING (Oxy-Acetylene Process)—See WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene Process)

CUTTING AND WELDING APPARATUS—See WELDING AND CUTTING APPARATUS (Electric)

CUTTING OILS
Sun Oil Co., Finance Bldg., Philadelphia, Pa.

CYLINDERS (Acetylene) — See ACETYLENE IN CYLINDERS

CYLINDERS (Oxygen) — See OXYGEN IN CYLINDERS

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Oakmont, Pa.

DECARBONIZING APPARATUS
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

DEOXIDIZERS
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York.

DERRICKS
American Terry Derrick Co., South Kearney, N. J.

DEWATERING EQUIPMENT
Dorr Company, 247 Park Ave., New York City.

DIE BLOCKS
Bethlehem Steel Co., Bethlehem, Pa.
Heppenstall Forge & Knife Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Strong Steel Foundry Co., 33 Norris St., Buffalo, N. Y.

DIE CASTINGS
Aluminum Co. of America, 2408 Oliver Bldg., Pittsburgh, Pa.
Newton Die Casting Corp., 146 Munson St., New Haven, Conn.
Stewart Die Casting Corp., 4535 Fullerton Ave., Chicago, Ill.

DIE HEADS (Automatic)
Landis Machine Co., Waynesboro, Pa.
National Acme Co., E. 131st St. & Coit Rd., Cleveland, Ohio.

DIE STEEL
Heppenstall Forge & Knife Co., 47th & A. V. R. R., Pittsburgh, Pa.

DIES
Bethlehem Steel Co., Bethlehem, Pa.
Niagara Machine & Tool Works, 685 Northland Ave., Buffalo.
Toledo Machine & Tool Co., Toledo, O.
Vanadium Corp. of America, 120 Broadway, New York City.

DOLOMITE MACHINES (Back Wall)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

DOORS & FRAMES (Water Cooled)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

DOORS AND SHUTTERS (Steel, Fire and Rolling)
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago.
Kinnear Mfg. Co., 818-868 Field Ave., Columbus, O.
Moeschl-Edwards Const. Co., The, 120 W. 9th St., Covington, Ky.
Truscon Steel Co., Youngstown, O.

DRAW BENCHES
Aetna-Standard Engineering Co., The, Youngstown, O.
Vaughn Machinery Corp., Cuyahoga Falls, O.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Vertical and Gang)
Barnes Drill Co., Rockford, Ill.

DRILLS (Pneumatic)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago.
Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLS (Rock)
Ingersoll-Rand Co., 11 Broadway, New York City.

DRIVES (Cut Herringbone Gears)
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Strong Steel Foundry Co., 33 Norris St., Buffalo, N. Y.

DRYERS (Sand, Coal, Ores, Chemical, Etc.)
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.

DUST ARRESTORS
Pangborn Corp., P. O. Box 858, Hagerstown, Md.

ECONOMIZERS
Babcock & Wilcox Co., 85 Liberty St., New York City.

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Fairbanks Co., Broome & LaFayette Sts., New York City.
Fairbanks, Morse & Co., Inc., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.

ELECTRIC TOOLS (Portable)—See TOOLS (Portable Electric)

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS (Elevating and Conveying)

ELEVATORS (Bucket)
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

ENGINE LATHES—See LATHES (Engine)

ENGINEERS AND CONTRACTORS
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Costello Engineering Co., 519 Oliver Bldg., Pittsburgh.
Kennedy, Julian, Bessemer Bldg., Pittsburgh, Pa.
Laughlin, Alex, & Co., First National Bank Bldg., Pittsburgh.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Pennsylvania Engineering Works, New Castle, Pa.
Phoenix Bridge Co., 20 South 15th St., Philadelphia, Pa.
Smythe, S. R., Co., The, House Bldg., Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pitsburgh, Pa.
Swindell, Wm., & Bros., P. O. Box 1753, Pittsburgh, Pa.

ENGINEERS (Consulting)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Freyn Engineering Co., 310 S. Michigan Ave., Chicago.
Kennedy, Julian, Bessemer Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Perin & Marshall, 11 West 42nd St. New York City.
Riehle Bros. Testing Machine Co., 1424 N. 9th St., Philadelphia.
Shover, Barton R., 424 Oliver Bldg., Pittsburgh, Pa.

ENGINEERS, CONSULTING (By-Product Coke Oven and Gas Plants)
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh.

ENGINES (Gas, Oil)
Fairbanks Co., Broome & LaFayette Sts., New York City.
Fairbanks, Morse & Co., Inc., 900 S. Wabash Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.

FACTORY AND INDUSTRIAL BUILDINGS — See BRIDGES, BUILDINGS, VIADUCTS, STACKS (Steel)

FACTORY EQUIPMENT (Steel)—See STOOLS AND FACTORY EQUIPMENT (Steel)

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Keokuk Electro-Metals Co. Keokuk, Iowa.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Vanadium Corp. of America, 120 Broadway, New York.

FERROCARBON TITANIUM
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Leavitt, C. W., & Co., 30 Church St., New York City.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.
Vanadium Corp. of America, 120 Broadway, New York.

FERROMANGANESE
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Globe Iron Co., Jackson, O.
Keokuk Electro-Metals Co., Keokuk, Iowa.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.
Vanadium Corp. of America, 120 Broadway, New York.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 120 Broadway, New York City.

FERRULES
Bay State Stamping Co., 380 Chandler St., Worcester, Mass.

FILTERS (Continuous Vacuum)
Dorr Company, 247 Park Ave., New York City.

FIRE BRICK AND CLAY
Ashland Fire Brick Co., Ashland, Ky.
Babcock & Wilcox Co., 85 Liberty St., New York City.
Climax Fire Brick Co., Climax, Pa.
Crescent Refractories Co., Curwensville, Clearfield Co., Pa.
Eureka Fire Brick Works, First National Bank Bldg., Pittsburgh, Pa.
Harbison-Walker Refractories Co., Farmers Bk. Bldg., Pittsburgh.

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FIRE BRICK AND CLAY Cont.
Kier Fire Brick Co., Oliver Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
Taylor, Chas., Sons Co., The, Burns St., Cincinnati, Ohio.

FIRE CLAY (Ground)
General Refractories Co., 106 S. 16th St., Philadelphia, Pa.
U. S. Refractories Corp., Mt. Union, Pa.

FIRE DOORS AND SHUTTERS
Kinnear Mfg. Co., The, 818-868 Field Ave., Columbus, O.
Moeschl-Edwards Const. Co., The, 120 W. 9th St., Covington, Ky.

FLANGES (Pipe)
Dart, E. M., Mfg. Co., Providence, R. I.

FLOORING—STEEL (Ventilating, Nonslipping, Fireproof)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.

FLOOR PLATES (Rolled Steel)— See **PLATES (Rolled Steel—Floor)**

FLUORSPAR
Aluminum Co. of America, 2408 Oliver Bldg., Pittsburgh, Pa.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.

FLUX (Welding)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

FORGING BILLETS—See BILLETS (Alloy and Carbon Steel)

FORGING BILLETS—See BILLETS (Forging)

FORGING FURNACES
Surface Combustion Co, 2375 Dorr St., Toledo, Ohio.

FORGING MACHINERY
Bliss, E. W., 53rd St. and 2nd Ave., Brooklyn, N. Y.

FORGINGS (Brass, Bronze and Copper)
American Brass Co., 25 Broadway, New York.
Storms Drop Forging Co., Springfield, Mass.

FORGINGS (Drop)
Bay City Forge Co., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Forge & Axle Co., 2001-2037 Dueber Ave., Canton, O.
Champion Machine & Forging Co., 3675 E. 78th St., Cleveland, O.
Cleveland City Forge Co., 45th and Lakeside Aves., Cleveland, O.
Drop Forging Co. of New York, 324 West Side Ave., Jersey City, N. J.
Fruin Drop Forge Co., 341-355 West Root St., Chicago, Ill.
Heppenstall Forge & Knife Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Philadelphia Steel & Iron Co., Commercial Trust Bldg., Philadelphia, Pa.
Queen City Forging Co., The, 235 Tennyson St., Cincinnati, O.
Rockford Drop Forge Co., Rockford, Ill.
Schuylkill Forge Co., 3rd & Luzerne St., Philadelphia, Pa.
Steel Car Forge Co., 410 Frick Bldg., Pittsburgh, Pa.
Storms Drop Forging Co., Springfield, Mass.
Transue & Williams Steel Forging Co., Alliance, Ohio.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
Erie Forge Co., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel)
Bay City Forge Co., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland City Forge Co., 45th and Lakeside Aves., Cleveland, O.
Drop Forging Co. of New York, 324 West Side Ave., Jersey City, N. J.
Erie Forge Co., Erie, Pa.
Heppenstall Forge & Knife Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Leard, Wm., Co., The, New Brighton, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
idvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Philadelphia Steel & Iron Co., Commercial Trust Bldg., Philadelphia, Pa.
Rockford Drop Forge Co., Rockford, Ill.
Steel Car Forge Co., 410 Frick Bldg., Pittsburgh, Pa.
Transue & Williams Steel Forging Corp., Alliance, O.
Vanadium Corp. of America, 120 Broadway, New York City.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh.

FOUR-SLIDE MACHINES
Nilson, A. H., Machine Co., Bridgeport, Conn.

FROGS AND SWITCHES
Bethlehem Steel Co., Bethlehem, Pa.

FURNACE CONTROLS (Open Hearth)
Morgan Construction Co., Worcester, Mass.

FURNACES (Blast)
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Freyn Engineering Co., 310 S. Michigan Ave., Chicago.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Mt. Vernon Bridge Co., Mt. Vernon, O.

FURNACES (Continuous Pair)
Hagan, Geo. J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., The. 1392 West 3rd St., Cleveland, Ohio.
Surface Combustion Co., 2375 Dorr St., Toledo, Ohio.

FURNACES (Electric)
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, O.
Swindell, Wm., & Brothers Co., P. O. Box 1753, Pittsburgh, Pa.

FURNACES (Electric Melting)
American Bridge Co., 71 Broadway, New York City.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Payne, N. B., & Co., 25 Church St., New York City.
Pittsburgh Electric Furnace Co., 32nd St. and Putney Way, Pittsburgh, Pa.

FURNACES (Open-Hearth)
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Incandescent Heat Co., Ltd., The, Cornwall Rd., Smethwick, Birmingham, Eng.
Laughlin, Alex, & Co., First National Bank Bldg., Pittsburgh, Pa.
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.
Smythe, S. R., Co., Oliver Bldg., Pittsburgh, Pa.

FURNACES (Recuperative)
Hagan, Geo. J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Incandescent Heat Co., Ltd., The, Cornwall Rd., Smethwick, Birmingham, Eng.
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.

FURNACES (Sheet and Tin Mill)
Costello Engineering Co., 519 Oliver Bldg., Pittsburgh, Pa.
Incandescent Heat Co., Ltd., The, Cornwall Rd., Smethwick, Birmingham, Eng.
Surface Combustion Co., 2375 Dorr St., Toledo, Ohio.

FURNACES (Soaking Pits)
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.

FURNACES (Steel Mill)
Morgan Construction Co., Worcester, Mass.
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.
Rust Engineering Co., American Bank Bldg., Pittsburgh, Pa.
Surface Combustion Co., 2375 Dorr St., Toledo, Ohio.

FURNACES (Steel Treating, Annealing and Case Hardening)
Costello Engineering Co., 519 Oliver Bldg., Pittsburgh, Pa.
Hagan, Geo. J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., 1392 W. 3rd St., Cleveland, O.
Surface Combustion Co., 2375 Dorr St., Toledo, Ohio.

FURNACES (Tube Welding and Bending)
Naismith, George, & Son, Highland Bldg., Pittsburgh, Pa.

GAGES (Welding)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

GALVANIZING
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Pittsburgh Electro Galvanizing Co., 5th & P. R. R., Sharpsburg, Pa.

GALVANIZING (Hot Dip)
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.

GALVANIZING PLANTS (For Sheets)
Erie Foundry Co., Erie, Pa.

GAS (Welding and Cutting)
Prest-O-Lite Co., Inc., The, 30 E. 42nd St., New York City.

GAS METERS — See METERS (Gas and Air)

GAS PRODUCER PLANTS
Flinn & Dreffein Co., 435 S. Dearborn St., Chicago, Ill.
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Wellman-Seaver-Morgan Co., The, 7025 Central Ave., Cleveland, O.
Wood, R. D., & Co., 400 Chestnut Ave., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Koppers Construction Co., The, Union Trust Bldg., Pittsburgh, Pa.

GEAR BLANKS
Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bronze Die Cast Corp., 100 Arthur St., Buffalo, N. Y.
Strong Steel Foundry Co., 33 Norris St., Buffalo, N. Y.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

GEAR GENERATORS
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.

GEARS (Reverse Marine)
General Electric Co., Schenectady, N. Y.
Johnson, Carlyle, Machine Co., Manchester, Conn.

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American Adamite Co., The, 410 Oliver Bldg., Pittsburgh, Pa.
Chicago Gear Mfg. Co., 2827 Fulton St., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.
Grant Gear Works, Second and B Sts., Boston, Mass.
Johnson, Carlyle, Machine Co., Manchester, Conn.
Jones, W. A., Foundry & Machine Co., 4437 W. Roosevelt Ave., Chicago, Ill.
Simonds Mfg. Co., 25th St. and Liberty Ave., Pittsburgh, Pa.

GENERATING SETS
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GENERATORS (Acetylene) — See ACETYLENE GENERATORS

GENERATORS (Electric)
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Coit Rd. and Kirby Ave., Cleveland, O.

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Oxweld Acetylene Co., 30 E. 42nd St., New York City.

GOGGLES (Welding)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

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Blaw-Knox Co., 602 First National Bank Bldg., Pittsburgh, Pa.
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.

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Landis Tool Co., Waynesboro, Pa.

GRINDERS (Electric-Pneumatic Portable)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.
Sullivan Machinery Co., 78 E. Adams St., Chicago, Ill.

GRINDERS (Roll)
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St. Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES
Farrell-Cheek Steel Foundry Co., Sandusky, O.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING PANS
Phillips & McLaren Co., 24th & Smallman Sts., Pittsburgh, Pa.

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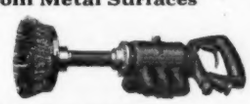

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Erie Foundry Co., Erie, Pa.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS (Chipping, Riveting and Calking)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago.
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS (Drop)
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Chambersburg—National Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Morgan Engineering Co., Alliance, Ohio.
Toledo Machine & Tool Co., Toledo, O.

HAMMERS (Forging)
Nazel Engineering & Machine Works, 4041 N. 5th St., Philadelphia, Pa.

HAMMERS (Power)
Erie Foundry Co., Erie, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

HAMMERS (Steam)
Chambersburg—National Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Morgan Engineering Co., Alliance, Ohio.

HANGERS (Door)
Myers, F. E., & Brother Co., The, Ashland, Ohio.

HANGERS (Shaft)
Hyatt Roller Bearing Co., Newark, N. J.

HARDNESS TESTING MACHINES
Shore Instrument & Mfg. Co., Van Wyck Ave. & Carll St., Jamaica, N. Y.

HEATERS (Air)
Babcock & Wilcox Co., 85 Liberty St., New York City.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

HEATERS (Electric Roll)
Freyn Engineering Co., 310 S. Michigan Ave., Chicago.

HEAT TREATING (Commercial)
Lakeside Steel Improvement Co., 5418 Lakeside Ave., Cleveland.

HOISTING MACHINERY
American Terry Derrick Co., So. Kearney, N. J.
Industrial Brownhoist Corp., 4403 St. Clair Ave., Cleveland, O.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.
Sprague Electric Hoist Division of the Shepard Electric Crane & Hoist Co., 30 Church St., New York City.
Treadwell Engineering Co., Easton, Pa.

HOISTS (Electric)
Box Crane & Hoist Corp., Janney & Ontario Sts., Philadelphia.
Cleveland Electric Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, O.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.
Roeper Crane & Hoist Works, 1729 No. 10th St., Reading, Pa.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.
Sprague Electric Hoist Division of the Shepard Electric Crane & Hoist Co., 30 Church St., New York City.

HOISTS (Pneumatic)
Hanna Engineering Works, 1766 Elston Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
Sullivan Machinery Co., 78 E. Adams St., Chicago, Ill.

HOISTS (Portable)
Sullivan Machinery Co., 78 E. Adams St., Chicago, Ill.

HONING MACHINES
Barnes Drill Co., Rockford, Ill.

HOOPS AND BANDS
Acme Steel Co., 2840 Archer Ave., Chicago, Ill.
Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Ryerson, Joseph T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Sharon Steel Hoop Co., Sharon, Pa.
West Leechburg Steel Co., Farmers Bk. Bldg., Pittsburgh.

HOSE (Welding)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

HOT BEDS
Treadwell Engineering Co., Easton, Pa.

HOT BLAST STOVES
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

HYDRANTS (Fire)
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg—National Chambersburg, Pa.
Morgan Engineering Co., Alliance, O.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES — See PRESSES (Hydraulic)

INDUSTRIAL HAULAGE & EQUIPMENT
Clark Tructractor Co., Battle Creek, Mich.
General Electric Co., Schenectady, N. Y.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, Ohio.

INSTRUMENTS (Electric, Indicating and Recording)
General Electric Co., Schenectady, N. Y.

INSULATING BLOCK
Armstrong Cork & Insulation Co., 101 24th St., Pittsburgh, Pa.

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Armstrong Cork & Insulation Co., 101 24th St., Pittsburgh, Pa.
Celite Products Co., 1320 So. Hope St., Los Angeles, Calif.
General Insulating & Mfg. Co., Alexandria, Ind.

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Armstrong Cork & Insulation Co., 101 24th St., Pittsburgh, Pa.
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Celite Products Co., 1320 So. Hope St., Los Angeles, Calif.

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Interstate Iron & Steel Co.,. . . 104 S. Michigan Ave., Chicago.

IRON (Bar)
Bethlehem Steel Co., Bethlehem, Pa.
Lockhart Iron & Steel Co. Pittsburgh, Pa.
Morris, Wheeler Co., 30th and Locust Sts., Philadelphia, Pa.
Penn Iron & Steel Co., Creighton, Pa.

IRON (Chain)
Bethlehem Steel Co., Bethlehem, Pa.
Lockhart Iron & Steel Co. Pittsburgh, Pa.
Penn Iron & Steel Co., Creighton, Pa.

IRON (Engine Bolt)
Bethlehem Steel Co., Bethlehem, Pa.
Penn Iron & Steel Co., Creighton, Pa.

IRON (Norway & Swedish)
Stahleker Steel Corp., 19 Congress St., Boston, Mass.

IRON (Silvery)
Globe Iron Co., Jackson, O.
Keokuk Electro-Metals Co., Keokuk, Iowa.

IRON (Stainless)
Firth-Sterling Steel Co., McKeesport, Pa.

IRON (Staybolt)
Bethlehem Steel Co., Bethlehem, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Penn Iron & Steel Co., Creighton, Pa.

IRON ORE
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.
Hillman Coal & Coke Co., First National Bank Bldg., Pittsburgh, Pa.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Quinn. Clement K., & Co., Duluth, Minn.

KEYS (Finished Machine)
Morton Mfg. Co., Muskegon, Mich.

KEYWAY CUTTERS (Stationary & Portable)
Morton Mfg. Co., Muskegon, Mich.

KNIVES AND SHEAR BLADES —See SHEAR BLADES AND KNIVES

LATHES
Shaw Crane-Putnam Mach., Co., 100 E. 42nd St., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

LATHES (Roll Turning)
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh.

LATHE DOGS
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

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Dietzel Lead Burning Co., Keystone Bldg., Pittsburgh, Pa.
Lovsey, Charles H., Co., 704 Park Bldg., Pittsburgh, Pa.

LEAD BURNING APPARATUS (Oxy-Acetylene)
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

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Farrell-Cheek Steel Foundry Co., Sandusky, O.

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United Engineering & Foundry Co., Farmers Bk Bldg., Pittsburgh.

LIFTING MAGNETS — See MAGNETS (Lifting)

LININGS (Lead for Pickling Tanks)
Lovsey, Charles H., Co., 704 Park Bldg., Pittsburgh, Pa.

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Sleeper & Hartley, Inc., Worcester, Mass.

LOCOMOTIVE CRANES — SEE CRANES (Locomotive)

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Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland O.
General Electric Co., Schenectady, N. Y.
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Whitcomb, Geo. D., Co., Rochelle, Ill.

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Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., 7025 Central Ave., Cleveland, O.

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Morey & Co., Inc., 410 Broome St., New York City.
Potts, Henry, & Co., 1608 Bankers Trust Bldg., Philadelphia.

MAGNETIC SEPARATORS — See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer Mfg. Co., The, Milwaukee, Wis.
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Ohio Electric & Controller Co., 5900 Maurice Ave., Cleveland, O.

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METAL (Perforated)—See PERFORATED METAL

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Ford, The J. B., Co., Wyandotte, Mich.

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Mundt, Chas., & Sons, Johnston & Fairmount Aves., Jersey City, N. J.

METAL STAMPINGS — See STAMPINGS

METAL WORKING MACHINES—See SHEET METAL WORKING MACHINERY

METALS (Nonferrous)
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

METERS (Gas and Air)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

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Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.

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National Roll & Foundry Co., Avonmore, Pa.
Treadwell Engineering Co., Easton, Pa.

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MIXERS (Sand)—See SAND MIXERS and SIFTERS

MIXING, KNEADING, TEMPERING & PLUGGING MACHINERY
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.

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Herman Pneumatic Machine Co., 806 Union Bank Bldg., Pittsburgh, Pa.

MOLDING MACHINES (Tractor Type Sand Throwing)
Beardsley & Piper Co., 2541 N. Keeler Ave., Chicago, Ill.

MOLDS (Ingot) — See INGOT MOLDS

MONEL METAL
International Nickel Co., 67 Wall St., New York City.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

MONORAIL SYSTEMS
Box Crane & Hoist Corp., Janney & E. Ontario Sts., Philadelphia, Pa.
Cleveland Electric Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, O.

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Century Electric Co., 1806 Pine Ave., St. Louis, Mo.
Fairbanks Co., Broome & LaFayette Sts., New York City.
Fairbanks, Morse & Co., Inc., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Coit Rd. and Kirby Ave., Cleveland, O.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

MUCK BAR
Bethlehem Steel Co., Bethlehem, Pa.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

NAILS
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., P. O. Box 72, Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

NAILS (Coated and Galvanized)
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NICKEL
American Mond Nickel Corp., Century Bldg., Pittsburgh, Pa.
International Nickel Co., 67 Wall St., New York City.
United States Nickel Co., New Brunswick, N. J.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.

NITROGEN (Gas)
Linde Air Products Co., 30 E. 42nd St., New York City.

NUTS
Bethlehem Steel Co., Bethlehem, Pa.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland Cap Screw Co., The, 2921 E. 79th St., Cleveland, O.
Lake Erie Bolt & Nut Co., 915 E. 63rd St., Cleveland, O.
Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Rhode Island Tool Co., Providence, R. I.
Rockford Bolt Co., 220 Mill St., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

OIL (Fuel)—See FUEL OIL

OIL CUPS
Gits Bros. Mfg. Co., 1940 S. Kilbourne Ave., Chicago, Ill.

OIL PANS
Transue & Williams Steel Forging Corp., Alliance, Ohio.

OPEN-HEARTH FURNACES—See FURNACES (Open Hearth)

ORES—CHROME —(Lump or Ground)
General Refractories Co., 106 S. 16th St., Philadelphia, Pa.

OVENS (Coke By-Product Recovery)
Koppers Construction Co., The, Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene Process)

OXYGEN IN CYLINDERS
Air Reduction Sales Co., 342 Madison Ave., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.

PACKING
Jenkins Brothers, 30 White St., New York City.

PARTITIONS & DOORS (Steel)
Lupton's, David, Sons Co., 2225 Allegheny St., Philadelphia, Pa.

PERFORATED METAL
Chicago Perforating Co., 2445 W. 24th Place, Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., The, 5634 Fillmore St., Chicago, Ill.
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.
Mundt, Chas., & Sons, Johnston & Fairmount Ave., Jersey City, N. J.

PICKLE ROOM EQUIPMENT
Ferro Enamel Supply Co., Keith Bldg., Cleveland, Ohio.

PICKLING COMPOUND
American Chemical Paint Co., Ambler, Pa.
Hearne, William M., Inc., Real Estate Trust Bldg., Philadelphia, Pa.
Higbie, Bradley, Co. McCormick Bldg., Chicago, Ill
International Paint Corp., 13th St. & Southern Ry., E. St. Louis, Ill.

PICKLING MACHINES
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.

PICKLING TANKS
Hauser Stander Tank Co., Cincinnati, Ohio.

PIG IRON
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Eaton, Rhodes & Co., First National Bank Bldg., Cincinnati, O.
Globe Iron Co., Jackson, O.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Hanna, The M. A., Co., Leader Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O
Pilling & Co., Inc., 1500 Chestnut St., Philadelphia, Pa.
Republic Iron & Stel Co., Youngstown, O.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Stewart Furnace Co., 1854 Union Trust Bldg., Cleveland, O.
Valley Mould & Iron Corp., Hubbard, Ohio.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

PILING (Steel Sheet)
Bethlehem Steel Co., Bethlehem, Pa.
Wemlinger, Inc., 149 Broadway, New York City.

PINIONS—See GEARS AND GEAR CUTTING

PIPE (Acid Resisting)
Duriron Co., Inc., The, Dayton, Ohio.

PIPE (Brass, Bronze and Copper)
American Brass Co., 25 Broadway, New York City.

PIPE (Cast Iron)
United States Cast Iron Pipe & Foundry Co., Burlington, N. J.

PIPE (Riveted and Spiral Riveted Steel)
Abendroth & Root Mfg. Co., Woolworth Bldg., New York.

PIPE (Seamless Steel and Seamless Iron)
Babcock & Wilcox Tube Co., 85 Liberty St., New York City.

PIPE (Steel)
Allegheny Steel Co., Brackenridge, Pa.
Babcock & Wilcox Tube Co., 85 Liberty St., New York City.
Crane Co., 836 S. Michigan Blvd., Chicago, Ill.
Michigan Steel Tube Products Co., Holbrook & Buffalo Sts., Detroit, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., The, Sharon, Pa.
Pittsburgh Steel Products Co., Union Trust Bldg., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE (Wrought Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

PIPE BENDS
Crane Co., 836 S. Michigan Blvd., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Curtis & Curtis Co., 316 Garden St., Bridgeport, Conn.
Landis Machine Co., Waynesboro, Pa.

PIPE FITTINGS
Crane Co., 836 S. Michigan Blvd., Chicago, Ill.
Pittsburgh Piping & Equipment Co., 43rd St. & A. V. R. R., Pittsburgh, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PIPE STRAIGHTENING MACHINES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PIPING CONTRACTORS
Pittsburgh Piping & Equipment Co., 43rd St. and A. V. R. R., Pittsburgh, Pa.
Power Piping Co., 829 Beaver Ave., Pittsburgh, Pa.

PISTON RODS
Heppenstall Forge & Knife Co., 47th & A. V. R. R., Pittsburgh, Pa.

PLANERS AND SHAPERS
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Shaw Crane-Putnam Mach. Co., 100 E. 42nd St., New York City.

PLANES (Traveling Head)
Morton Mfg. Co., Muskegon, Mich.

PLATE CASTORS
Hyatt Roller Bearing Co., Newark, N. J.

PLATES (Iron and Steel)
American Rolling Mill Co., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.

PLATES (Rolled Steel—Floor)
American Pressed Steel Co., Commercial Trust Bldg., Philadelphia, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

PLATES (Sheared and Universal)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City Steel Co., The, Granite City, Ill.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1219 Wabansia Ave., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
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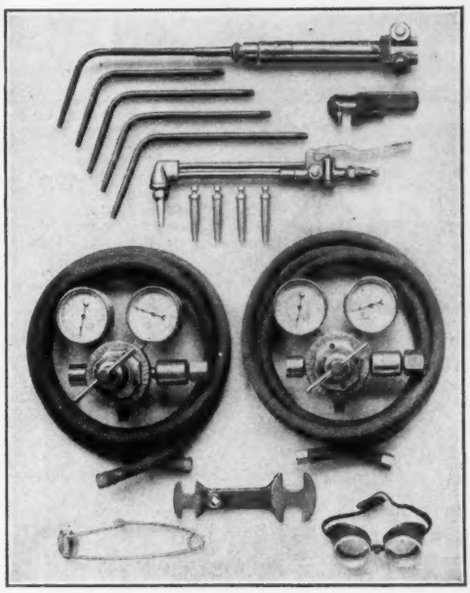

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Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

PLATES (Terne and Tin)—See TIN PLATE

PLATING (Electro)

Pittsburgh Electro Galvanizing Co., 5th and P. R. R., Pittsburgh, Pa.

PLUMBING EQUIPMENT

Crane Co., 836 S. Michigan Blvd., Chicago, Ill.

PNEUMATIC TOOLS—See TOOLS—(Pneumatic)

POLE LINE HARDWARE

Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.

POLES (Tubular Steel)

National Tube Co., Frick Bldg., Pittsburgh, Pa.

PORCELAIN ENAMELS

Ferro Enamel Supply Co., Keith Bldg., Cleveland, Ohio.

PORCELAIN ENAMELING EQUIPMENT

Ferro Enamel Supply Co., Keith Bldg., Cleveland, Ohio.

PORTABLE LOADERS (Bucket or Belt)

Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

PORTS (Water Cooled)

Blaw Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

POTS (Salt, Lead, Cyanide)

Case Hardening Service Co., 2280 Scranton Rd., Cleveland, O.

POWDERED COAL EQUIPMENT

Combustion Engineering Corp., 200 Madison Ave., New York City.
Fuller Lehigh Co., Fullerton, Pa.

POWER TRANSMISSION

Jones, W. A., Foundry & Machine Co., 4437 W. Roosevelt Ave., Chicago, Ill.

PREHEATERS

Babcock & Wilcox Co., 85 Liberty St., New York City.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Combustion Engineering Corp., 200 Madison Ave., New York City.

PREHEATING APPARATUS

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

PRESSED METAL—See STAMPINGS

PRESSED STEEL PARTS — See STAMPINGS

PRESSES

Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Niagara Machine & Tool Works, 685 Northland Ave., Buffalo,
Toledo Machine & Tool Co., Toledo, O.

PRESSES (Die Cutting)

Logemann Bros. Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Forging)

Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.

PRESSES (Hydraulic)

Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Chambersburg—National, Chambersburg, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Metal Drawing, Etc.)

Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.

PRESSES (Scrap Bundling and Baling)

Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Shaft and Pipe Straightening—Hydraulic)

Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PULVERIZING, CRUSHING & GRINDING MACHINERY — See CRUSHING, GRINDING & PULVERIZING MACHINERY

PUMPS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks Co., Broome & LaFayette Sts., New York City.
Fairbanks, Morse & Co., Inc., 900 S. Wabash Ave., Chicago, Ill.

PUMP (Acid Resisting)

Duriron Co., Inc., The, Dayton, Ohio.

PUMPS (Air Lift)

Sullivan Machinery Co., 78 E. Adams St., Chicago, Ill.

PUMPS (Boiler Feed)

Ingersoll-Rand Co., (Cameron), 11 Broadway, New York City.

PUMPS (Centrifugal)

Ingersoll-Rand Co., (Cameron), 11 Broadway, New York City.

PUMPS (Diaphragm)

Dorr Company, 247 Park Ave., New York City.

PUMPS (Hand and Power)

Myers, F. E., & Brother Co., The, Ashland, O.

PUMPS (Hydraulic)

Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Steam)

Ingersoll-Rand Co., (Cameron), 11 Broadway, New York City.

PUNCHES (Multiple)

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Thomas Spacing Machine Co., Fulton Bldg., Pittsburgh, Pa.

PUNCHES AND DIES

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Richards, I. P., Co., 21 Pemberton St., Providence, R. I.

PUNCHING AND SHEARING MACHINERY

Beatty Machine & Mfg. Co., Hammond, Ind.
Chambersburg—National, Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Kent-Owens Machine Co., 958 Wall St., Toledo, O.
Long & Allstatter Co., Hamilton, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Smith, David H., & Sons, Inc., 51st and Second Ave., Brooklyn, N. Y.

PYROMETERS (Recording & Indicating)

Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

RAILS

Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Frank, M. K., Union Trust Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

RAILS (Girder)

Bethlehem Steel Co., Bethlehem, Pa.

REFRACTORIES

Babcock & Wilcox Co., 85 Liberty St., New York City.
Carborundum Co., The, Perth Amboy, N. J.
Crescent Refractories Co., Curwensville, Pa.
General Refractories Co., 106 S. 16th St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Farmers Bk. Bldg., Pittsburgh.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Kier Fire Brick Co., Oliver Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Lavino, E. J., Co., Bullitt Bldg., Philadelphia, Pa.
Norton Co., Worcester, Mass.
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
Stowe-Fuller Refractories Co., The, 1650 Union Trust Bldg., Cleveland, O.
Taylor, Chas., Sons Co., The, Burns St., Cincinnati, O.

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Auer Register Co., The, Payne Ave. and E. 37th St., Cleveland, O.

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RHEOSTATS

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Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hunter Saw & Machine Co., 5656 Butler St., Pittsburgh, Pa.

RIVETERS (Hydraulic)

Chambersburg—National Chambersburg, Pa.

RIVETERS (Pneumatic)

Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Hanna Engineering Works, 1766 Elston Ave., Chicago, Ill.

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Hanna Engineering Works, 1766 Elston Ave., Chicago, Ill.
Shuster, The F. B., Co., New Haven, Conn.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS

Bethlehem Steel Co., Bethlehem, Pa.
Clark Bros. Bolt Co., Milldale, Conn.
Illinois Steel Warehouse Co., 1310 Wabansia Ave., Chicago, Ill.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago.
Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Joseph T., & Son, Inc., 16th and Rockwell Sts., Chicago.

ROCK WOOL

General Insulating & Mfg. Co., Alexandria, Ind.

RODS (Brass, Bronze, Copper and Nickel Silver)

American Brass Co., 25 Broadway, New York City.

RODS (Drill)

Globe Wire Co., Sharpsburg, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

RODS (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.

RODS (Rounds, Flats & Shapes)

Washburn Wire Co., Phillipsdale, R. I.

RODS (Welding)—See WELDING RODS

ROLLING DOORS AND SHUTTERS

Kinnear Manufacturing Co., 813-868 Field Ave., Columbus, O.
Moeschl-Edwards Const. Co., The, 120 W. 9th St., Covington, Ky.

ROLLING MILL BEARINGS

Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearing Corp., Stamford, Conn.

ROLLING MILL EQUIPMENT

Aetna-Standard Engineering Co., The, Youngstown, O.
Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St., Brooklyn, N. Y.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh.

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ROLLS (Lathe Turning)
Aetna-Standard Engineering Co., Youngstown, Ohio.

ROLLS (Sand and Chilled)
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.

ROLLS (Steel)
Aetna-Standard Engineering Co., The, Youngstown, O.
American Adamite Co., The, 410 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., Avonmore, Pa.
Pittsburgh Rolls Corp., 41st St. and A. V. Ry., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh, Pa.

ROLLS (Tinning)
Heppenstall Forge & Knife Co., 47th & A. V. R. R., Pittsburgh, Pa.

ROLLS (Wood)
Dart, E. M., Mfg. Co., Providence, R. I.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., Middletown, Ohio.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio.
Empire Steel Corp., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Robertson, H. H., Co., 1st National Bank Bldg., Pittsburgh, Pa.
Superior Sheet Steel Co., Canton, Ohio.
Trumbull Steel Co., The, Warren, Ohio.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROOFING TILE (Cement)
American Cement Tile Mfg. Co., Oliver Bldg., Pittsburgh, Pa.

ROOFS (Open Hearth & Heating Furnaces)
Detrick, M. H., Co., 140 S. Dearborn St., Chicago.

ROPE SOCKETS (Cast Steel)
Chicago Steel Foundry Co. Kedzie Ave. at 37th St., Chicago, Ill.

RUST PREVENTATIVE
American Chemical Paint Co., Ambler, Pa.

RUST REMOVING COMPOUND
American Chemical Paint Co., Ambler, Pa.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

SAND (Molding)
Portage Silica Co., The, 602 Stambaugh Bldg., Youngstown, O.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.

SAND (Sandblast)
Portage Silica Co., The, 602 Stambaugh Bldg., Youngstown, O.

SAND BLAST ABRASIVE (Shot and Grit)
Pittsburgh Crushed Steel Co., 61st & A. V. R. R., Pittsburgh, Pa.

SANDBLAST EQUIPMENT AND ACCESSORIES
Pangborn Corp., P. O. Box 858, Hagerstown, Md.

SAND CONDITIONING AND PREPARING MACHINERY
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 No. Keeler Ave., Chicago, Ill.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

SAND CONVEYING AND HANDLING MACHINERY
Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.

SAND SLINGERS
Beardsley & Piper Co., 2541 N. Keeler Ave., Chicago, Ill.

SASH (Steel)
Lupton's, David, Sons Co., 2225 Allegheny St., Philadelphia, Pa.

SAW SHARPENING MACHINES
Hunter Saw & Machine Co., 5656 Butler St., Pittsburgh, Pa.

SAWS (Hot & Cold Metal Cutting —Band, Circular-Hack)
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting Power)
Hunter Saw & Machine Co., 5656 Butler St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh.

SCALES (Computing)
National Scale Co., Chicopee Falls, Mass.

SCALES (Dial)
Buffalo Scale Co., 1200 Niagara St., Buffalo, N. Y.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.

SCALES (Industrial, Motor Truck, Railroad Track, Rolling Mill)
Buffalo Scale Co., 1200 Niagara St., Buffalo, N. Y.
Fairbanks Co., Broome and Lafayette Sts., New York City.
Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.

SCALES—AUTOMATIC DIAL (Heavy Duty, Bench, Overhead Track, Tank, Hanging, Packing, Counting, Special Purposes)
Buffalo Scale Co., 1200 Niagara St., Buffalo, N. Y.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.

SCLEROSCOPE, HARDNESS MEASURING
Shore Instrument & Mfg. Co., Van Wyck Ave. and Carll St., Jamaica, N. Y.

SCRAP BALING PRESSES
Logemann Bros., Co., 3126 Burleigh St., Milwaukee, Wis.

SCREENS AND SIEVES
Chicago Perforating Co., 2445 W. 24th Place, Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago.
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.
Mundt, Chas., & Sons, Johnston and Fairmont Aves., Jersey City, N. J.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
National Acme Co., E. 131st St. & Coit Rd., Cleveland.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Bristol, Conn.
Michigan Screw Co., S. Hosmer Ave., Lansing, Mich.
National Acme Co., E. 131st & Coit Rd., Cleveland, O.
Union Screw & Mfg. Co., 207 S. Main St., Pittsburgh, Pa.

SCREW STOCK
Union Drawn Steel Co., Beaver Falls, Pa.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SCREWS
Acme Machine Products Co., Muncie, Ind.
Clark Bros. Bolt Co., Milldale, Conn.
Progressive Mfg. Co., Torrington, Conn.

SCREWS (Cap, Set and Safety)
Allen Mfg. Co., Hartford, Conn.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland Cap Screw Co., The, 2921 E. 79th St., Cleveland, O.
Rhode Island Tool Co., Providence, R. I.
Union Screw & Mfg. Co., 207 S. Main St., Pittsburgh, Pa.

SCREWS (Cold Headed)
Acme Machine Products Co., Muncie, Ind.
Cleveland Cap Screw Co., The, 2921 E. 79th St., Cleveland, Ohio.

SCREWS (Lag)
Kirk-Latty Co., 1917 W. 85th St., Cleveland, O.
Lamson & Sessions Co., The, 2188 Scranton Rd., Cleveland, O.

SEAMLESS STEEL TUBING—See TUBES (Cold Drawn Seamless Steel)

SEPARATORS (Magnetic)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric & Controller Co., 5900 Maurice Ave., Cleveland, O.

SHAFT AND PIPE STRAIGHTENERS (Hydraulic)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

SHAFT HANGERS
Hyatt Roller Bearing Co., Newark, N. J.

SHAFTING
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Beaver Falls, Pa.
Vanadium Corp. of America, 120 Broadway, New York City.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPERS—See PLANERS AND SHAPERS

SHAPERS (Heavy Duty Draw-Cut)
Morton Mfg. Co., Muskegon, Mich.

SHAPES (Steel)—See STEEL (Structural)

SHEAR BLADES AND KNIVES
Heppenstall Forge & Knife Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Bliss, E. W., Co., 53rd and 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Niagara Machine & Tool Works, 685 Northland Ave., Buffalo, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Smith, David H., & Sons, Inc., 51st and Second Ave., Brooklyn, N. Y.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Foundry Co., Farmers Bk. Bldg., Pittsburgh.

SHEET BARS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Hausman & Wimmer Co., The, Clark Bldg., Pittsburgh, Pa.
Republic Iron & Steel Co., Youngstown, Ohio.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORK
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHEET METAL WORKING MACHINERY
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 685 Northland Ave., Buffalo, N. Y.
Smith, David H., & Sons, Inc., 51st and Second Ave., Brooklyn, N. Y.
Toledo Machine & Tool Co., Toledo, O.

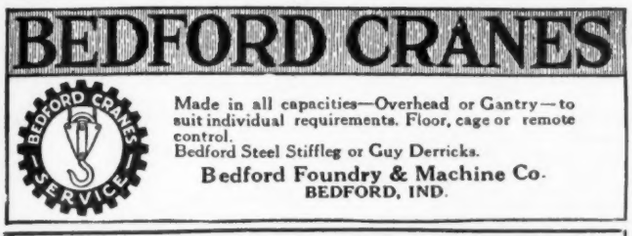
SHEETS (Acid Resisting)
Duriron Co., Inc., The, Dayton, Ohio.

SHEETS (Black)
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Eastern Rolling Mill Co., Baltimore, Md.
Empire Steel Corp., Mansfield, Ohio.
Granite City Steel Co., The, Granite City, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.

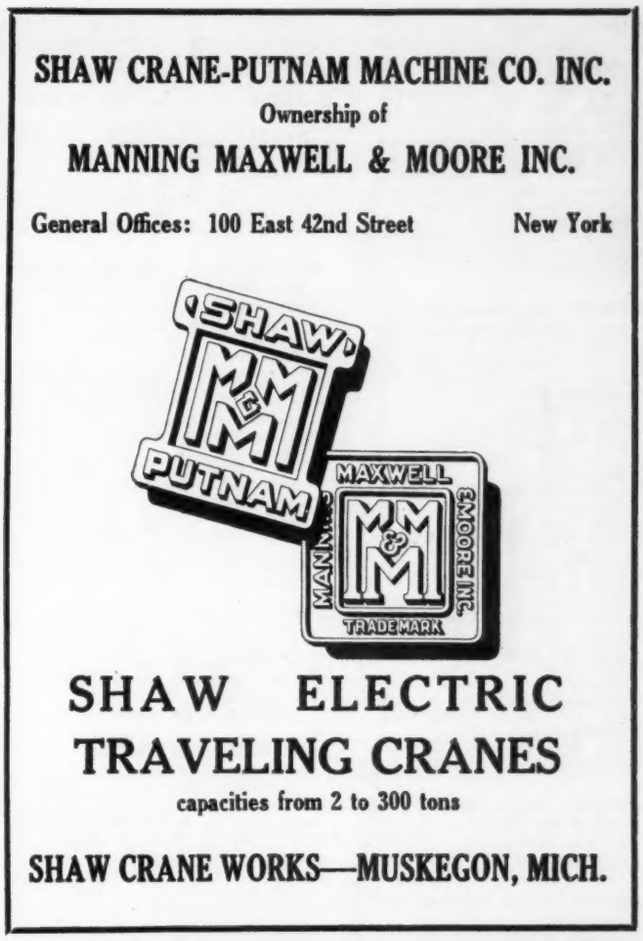
See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

All Bucket! "Built to Dig and Last While Digging"
G. H. Williams Co., 611 Haybarger Lane, Erie, Pa. Branch Offices: New York, Pittsburgh, Cleveland, Chicago
WILLIAMS
FAST-DIGGING BUCKETS

Ohio
LIFTING MAGNETS
are long lived
All insulation is Asbestos. They have maximum lifting capacity. Outer pole has no through holes; it does not loosen, wears slowly and seldom breaks.
The Ohio Electric & Controller Co.
Cleveland, Ohio


BEDFORD CRANES
Made in all capacities—Overhead or Gantry—to suit individual requirements. Floor, cage or remote control.
Bedford Steel Stiffleg or Guy Derricks.
Bedford Foundry & Machine Co.
BEDFORD, IND.

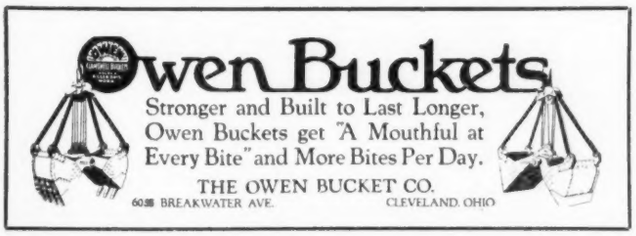
PUNCHING MACHINERY
BEATTY
SHEARING MACHINERY
PORTABLE CRANES
Multiple Punching Machines
Plate Shearing Machines
Bar Shearing Machines
Beatty Machine and Manufacturing Company
HAMMOND INDIANA

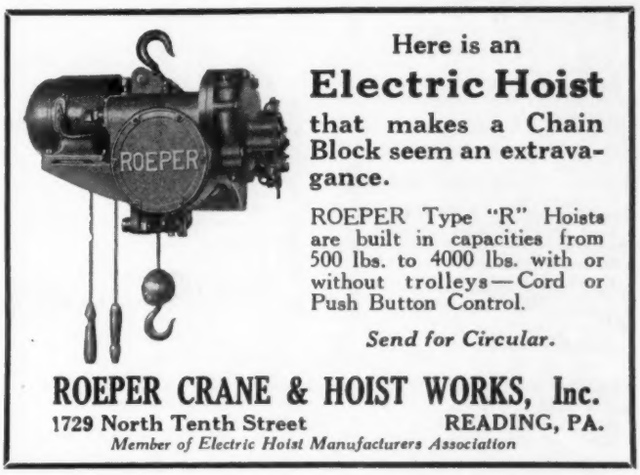

SHAW CRANE-PUTNAM MACHINE CO. INC.
Ownership of
MANNING MAXWELL & MOORE INC.
General Offices: 100 East 42nd Street New York
SHAW
PUTNAM
MAXWELL
MANNING MOORE INC.
TRADE MARK
SHAW ELECTRIC
TRAVELING CRANES
capacities from 2 to 300 tons
SHAW CRANE WORKS—MUSKEGON, MICH.

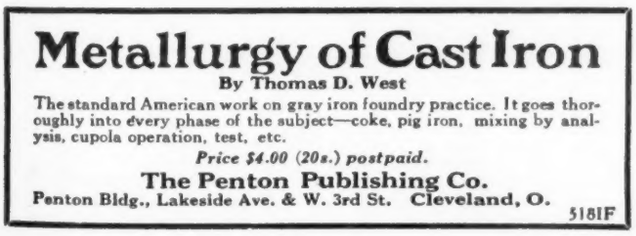
CHAIN
for every industrial purpose
AMERICAN CHAIN COMPANY, Inc.
Bridgeport, Connecticut
District Sales Offices:
Boston Chicago New York Philadelphia
Pittsburgh San Francisco
In Canada: Dominion Chain Company, Ltd., Niagara Falls, Ontario
ACCO

For Your Yard Work
CORDUROY CRANES
P&H
Equipped with hook, bucket, clamshell or magnet, they can easily handle any kind of loose materials. Easily maneuvered on their Corduroy traction—no tracks required.
Ask for Bulletin 43-x
HARNISCHFEGER CORPORATION
Established 1884
3811 National Avenue, Milwaukee, Wis.

CLEVELAND
CRANES
Engineered Into Your Plant
The Cleveland Crane & Engineering Co.
Wickliffe, Ohio
7


Owen Buckets
Stronger and Built to Last Longer, Owen Buckets get "A Mouthful at Every Bite" and More Bites Per Day.
THE OWEN BUCKET CO.
6085 BREAKWATER AVE. CLEVELAND, OHIO


Here is an
Electric Hoist
that makes a Chain Block seem an extravagance.
ROEPER
ROEPER Type "R" Hoists are built in capacities from 500 lbs. to 4000 lbs. with or without trolleys—Cord or Push Button Control.
Send for Circular.
ROEPER CRANE & HOIST WORKS, Inc.
1729 North Tenth Street READING, PA.
Member of Electric Hoist Manufacturers Association


Metallurgy of Cast Iron
By Thomas D. West
The standard American work on gray iron foundry practice. It goes thoroughly into every phase of the subject—coke, pig iron, mixing by analysis, cupola operation, test, etc.
Price $4.00 (20s.) postpaid.
The Penton Publishing Co.
Penton Bldg., Lakeside Ave. & W. 3rd St. Cleveland, O.
518IF

SHEETS (Black) Cont.

Morris, Wheeler & Co., 30th & Locust Sts., Philadelphia, Pa.
Newton Steel Co., Youngstown, O.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Sharon Steel Hoop Co., Sharon, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Blue Annealed)

American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Corp., San Francisco, Calif.
Empire Steel Corp., Mansfield, Ohio.
Granite City Steel Co., The, Granite City, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Morris, Wheeler & Co., 30th & Locust Sts., Philadelphia, Pa.
Newton Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago.
Sharon Steel Hoop Co., Sharon, Pa.
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Wood, Alan, Iron & Steel Co., Widener Bldg., Philadelphia, Pa.

SHEETS (Brass, Bronze, Copper and Nickel Silver)

American Brass Co., 25 Broadway, New York City.

SHEETS (Deep Drawing and Stamping)

American Rolling Mill Co., Middletown, Ohio.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, O.
Eastern Rolling Mill Co., Baltimore, Md.
Empire Steel Corp., Mansfield, Ohio.
Granite City Steel Co., The, Granite City, Ill.
Newton Steel Co., Youngstown, O.
Republic Iron & Steel Co., Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Electrical)

American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Steel Corp., Mansfield, Ohio.

SHEETS (Galvanized)

American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Granite City Steel Co., The, Granite City, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Perforated)

Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING (Corrugated and Plain)

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)

Empire Steel Corp., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)

Allegheny Steel Co., Brackenridge, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Central Alloy Steel Corp., Massillon, Ohio.
Eastern Rolling Mill Co., Baltimore, Md.
Empire Steel Corp., Mansfield, Ohio.
Newton Steel Co., Youngstown, Ohio.
Seneca Iron & Steel Co., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

SHELVING (Steel, Adjustable)

Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.
Lupton's, David, Sons Co., 2225 Allegheny St., Philadelphia.
National Scale Co., Chicopee Falls, Mass.

SHIPBUILDING SHAPES

Bethlehem Steel Co., Bethlehem, Pa.

SIEVES—See SCREENS & SIEVES

SILICO MANGANESE

Vanadium Corp. of America, 120 Broadway, New York.

SKIP HOISTS

Bartlett, C. O., & Snow Co., 6203 Harvard Ave., Cleveland, O.

SLABS

Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.

SLABS (Concrete Floor)

American Cement Tile Mfg. Co., Oliver Bldg., Pittsburgh, Pa.

SLOTTING MACHINES

Nazel Engineering & Machine Works, 4041 N. 5th St., Philadelphia, Pa.

SOAKING PIT COVERS

Detrick, M. H., Co., 140 S. Dearborn St., Chicago, Ill.

SOAKING PITS

Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Incandescent Heat Co., Ltd., The, Cornwall Rd., Smethwick, Birmingham, England.

SPACING TABLES

Thomas Spacing Machine Co., Fulton Bldg., Pittsburgh, Pa.

SPECIAL MACHINERY

Aetna-Standard Engineering Co., The, Youngstown, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Treadwell Engineering Co., Easton, Pa.

SPEED REDUCERS

Grant Gear Works, Second and B Sts., S. Boston, Mass.
Jones, W. A., Foundry & Machine Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Philadelphia Gear Works, E. Tioga, Philadelphia, Pa.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

SPIEGELEISEN

Leavitt, C. W., & Co., 30 Church St., New York City.
Rogers Brown & Crocker Bros., Inc., 21 E. 40th St., New York.

SPIKES

Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.

SPRING MAKING MACHINERY

Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS

American Spiral Spring & Mfg. Co., Arsenal Station, Pittsburgh, Pa.
American Spring & Mfg. Co., Elm St., Holly, Mich.
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Barnes, Wallace, Co., The, Bristol, Conn.
Barnes-Gibson-Raymond, Inc., 6400 Miller Ave., Detroit, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Gibson, Wm. D., Co. 1800 Clybourn Ave., Chicago, Ill.
Hunter Pressed Steel Co., Lansdale, Pa.
Muehlhausen Spring Co., Logansport, Ind.
Peterson Spring Co., The, 1660 Beard Ave., Detroit, Mich.
Raymond Mfg. Co., Centre St., Corry, Pa.
Washburn Wire Co., Inc., 118th & Harlem River, New York.

SPRUE CUTTERS

Shuster, The F. B., Co., New Haven, Conn.

STACKS (Steel)

American Bridge Co., The, 71 Broadway, New York City.

STAMPINGS

American Spring & Mfg. Co., Elm St., Holly, Mich.
American Tube & Stamping Plant, The, (The Stanley Works), Bridgeport, Conn.
Barnes, Wallace, Co., The, Bristol, Conn.
Bay State Stamping Co., 380 Chandler St., Worcester, Mass.
Breese Bros. Co., The, 2347 Reading Rd., Cincinnati, O.
Central Iron & Steel Co., Harrisburg, Pa.
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.
G G G Metal Stamping Co., Dept. D, Warren, Pa.
Hydraulic Pressed Steel Division of Truscon Steel Co., 6100 Hydraulic Ave., Cleveland, O.
Joliet Wrought Washer Co., Joliet, Ill.
Lansing Stamping Co., Lansing, Mich.
Raymond Mfg. Co., Corry, Pa.
Stanley Works, The, New Britain, Conn.
Transue & Williams Steel Forging Corp., Alliance, O.

STAMPS, STEEL AND MARKING DIES

Schwerdtle Stamp Co., 39 Cannon St., Bridgeport, Conn.

STARTERS (Electric Motor)

Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

STEEL

Bethlehem Steel Co. Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Gulf States Steel Co., Birmingham, Ala.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago.
Kidd Drawn Steel Co., Aliquippa, Pa.
Pacific Coast Steel Co., Hunter-Dulin Bldg., San Francisco, Calif.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL (Alloy)

Babcock & Wilcox Tube Co., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Central Alloy Steel Corp., Massillon, O.
Colonial Steel Co., Keystone Bldg., Pittsburgh, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago.
Jessop Steel Co., Washington, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., The, Canton, O.
Vanadium Corp. of America, 120 Broadway, New York City.

STEEL (Alloy, Cold Drawn)

Union Drawn Steel Co., Beaver Falls, Pa.

STEEL (Carbon)

Bethlehem Steel Co., Bethlehem, Pa.

STEEL (Cold Drawn)

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Globe Wire Co., Sharpsburg, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Ryerson, Jos. T., & Son, Inc. 16th and Rockwell Sts., Chicago.
Superior Steel Products Co., Monaca, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL (Crucible)

Colonial Steel Co., Keystone Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Electric)

Heppenstall Forge & Knife Co., 47th & A. V. R. R., Pittsburgh, Pa.

STEEL (High Speed)

Colonial Steel Co., Keystone Bldg., Pittsburgh, Pa.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

LARGEST BUILDERS OF THE WORLD'S LARGEST CRANES

Alliance Products

STANDARD CRANES
Up to 430 tons capacity

STRIPPING CRANES
Up to 320 tons capacity

COMBINATION CHARGERS and STRIPPERS
Up to 200 tons capacity

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Soaking Pit Cranes
Open Hearth Charging Machines
Slab and Billet Charging and Drawing Machines
Gantry Cranes
Ore and Coal Bridges
Car Dumpers
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Steam Drop Forge Hammers
Coke Pushers, Levelers and Door Lifters
Coal Pier Equipment
Rolling Mill Machinery
Cement Plant Machinery
Dock Handling Equipment
Coke Oven Equipment

234 of 100 Ton capacity and over

LADLE AND STANDARD CRANES

58	100 tons
2	115 tons
4	Worm Driven Ladle....125 tons
44	125 tons
27	150 tons
3	Worm Driven Ladle....160 tons
2	Worm Driven Ladle....165 tons
3	Worm Driven Ladle....175 tons
26	175 tons
2	200 tons
1	225 tons
1	250 tons
1	275 tons
3	430 tons

STRIPPING CRANES

8	100 tons
1	125 tons
21	150 tons
15	200 tons
1	Single Ram, 320 tons

COMBINATION CHARGERS AND STRIPPERS

3	100 tons
1	125 tons
3	150 tons
4	200 tons

Give Us the Runway and We will Lift the World

THE ALLIANCE MACHINE CO.

ALLIANCE, OHIO, U.S.A.
ENGINEERS AND BUILDERS

MORGAN

DESIGNERS-MANUFACTURERS-CONTRACTORS

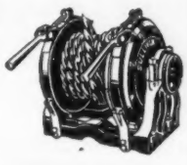
Electric Traveling Cranes, Rolling Mill Machinery, Steam Hammers, Steam Hydraulic Forging Presses, Hydraulic Presses, Rock Crushers, Machine work of all kinds. Special Machinery for any purpose.

THE MORGAN ENGINEERING CO., ALLIANCE, OHIO

A BULLSEYE IN TIME SAVING

This little hoist lifts a ton or pulls a 50-ton car. It's quicker and cheaper than hand labor. Send for "Handy Hoisting and Hauling" Booklet.

Sullivan Machinery Company
78 E. Adams St., Chicago



LOCOMOTIVES

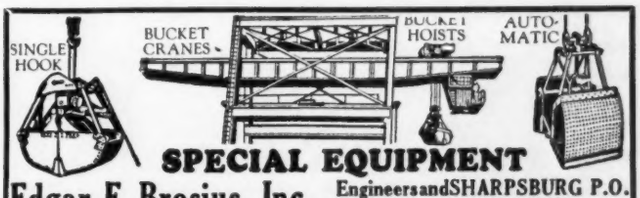
GASOLINE ELECTRIC

Geo. D. Whitcomb Co.
Rochelle, Ill.

TERRY STEEL ERECTOR'S DERRICKS

Terry Derrick Fittings for general construction work.

AMERICAN-TERRY-DERRICK CO.
South Kearny, N. J.



SPECIAL EQUIPMENT

Edgar E. Brosius, Inc. Engineers and Manufacturers SHARPSBURG P.O. PITTSBURGH, PA.

BUCKETS

for all kinds of digging and re-handling—single line (hook-on), 2 line, 4 line Clamshells

dragline

BLAW-KNOX COMPANY
FARMERS BANK BLDG. PITTSBURGH, U.S.A.

clamshell

ELECTRIC OR HAND CRANES

ELECTRIC HOISTS

Write for Literature

BOX CRANE & HOIST CORP.
One of the Pioneer Crane Builders
Janney and E. Ontario Sts. Philadelphia, Penna.

STEEL (High Speed) Cont.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Poldi Steel Corp. of America, 245 West 18th St., New York City.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL (Open Hearth)
Gulf States Steel Co., Brown Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Open-Hearth—Cold Drawn)
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL (Rustless)
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Screw Stock)
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Superior Steel Products Co., Monaca, Pa.

STEEL (Special Analysis)
Timken Roller Bearing Co., The, Canton, Ohio.

STEEL (Spring)
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Vanadium Corp. of America, 120 Broadway, New York City.

STEEL (Stainless)
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Strip, Hot and Cold Rolled)
Acme Steel Co., 2849 Archer Ave., Chicago, Ill.
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
American Tube & Stamping Plant, The, (The Stanley Works) Bridgeport, Conn.
Central Alloy Steel Corp., Massillon, O.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago.
Stanley Works, The, New Britain, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.

STEEL (Structural)
Alliance Structural Co., The, Alliance, O.
American Bridge Co., 71 Broadway, New York City.
Belmont Iron Works, 22nd and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Eichleay, John, Jr., Co., So. 20th and Wharton, Pittsburgh, Pa.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Kratzer, W. N., Co., 3212 Smallman St., Pittsburgh, Pa.
McClintic-Marshall Co., Oliver Bldg., Pittsburgh, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.
Pacific Coast Steel Co., Hunter-Dulin Bldg., San Francisco, Calif.
Phoenix Iron Co., The, 20 So. 15th St., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

STEEL (Swedish)
Stahleker Steel Corp., 19 Congress St., Boston, Mass.

STEEL (Tool)
Bethlehem Steel Co., Bethlehem, Pa.
Colonial Steel Co., Keystone Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop Steel Co., Washington, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Poldi Steel Corp. of America 245 West 18th St., New York City.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS AND VIADUCTS (Steel)

STEEL DOORS AND SHUTTERS —See DOORS & SHUTTERS (Steel, Fire & Rolling)

STEEL FABRICATORS—See BRIDGES, BUILDINGS AND VIADUCTS (Steel)

STEEL PLATE CONSTRUCTION
Biggs Boiler Co., The, Akron, O.
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Petroleum Iron Works Co., The, Sharon, Pa.
Riter-Conley Co., 1207 Oliver Bldg., Pittsburgh, Pa.
Steel Plate Products Co., Pottstown, Pa.

STEEL PLATES — See PLATES (Iron and Steel)

STEEL STAMPINGS—See STAMPINGS

STELLITE
Haynes Stellite Co., 30 E. 42nd St., New York City.

STEP HANGERS
Transue & Williams Steel Forging Corp., Alliance, O.

STEPS (Safety Stair, Car and Ladder)
Hendrick Mfg. Co., 43 Dundaff St., Carbondale, Pa.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Combustion Engineering Corp., 200 Madison Ave., New York City.

STOOLS AND FACTORY EQUIPMENT (Steel)
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

STRAIGHTENING MACHINERY
Shuster, The F. B., Co., New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

STRIP MILLS (Hot or Cold)
Morgan Construction Co., Worcester, Mass.
Treadwell Engineering Co., Easton, Pa.

STRUCTURAL IRON AND STEEL WORK — See STEEL (Structural)

SULPHURIC ACID
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.

SWITCHBOARDS
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

SWITCH STANDS
Bethlehem Steel Co., Bethlehem, Pa.

SWITCHES (Electric)
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

TANKS (Storage, Pressure, Riveted, Welded)
Air Tight Steel Tank Co., Mansion and Gloster Sts., Pittsburgh, Pa.
Biggs Boiler Co., The, Akron, O.
Hammond Iron Works, Warren, Pa.
Petroleum Iron Works Co., The, Sharon, Pa.
Riter-Conley Co., 1207 Oliver Bldg., Pittsburgh, Pa.
Scaife, Wm. B., & Sons Co., Oakmont, Pa.
Steel Plate Products Co., Pottstown, Pa.

TANKS—WOOD (For All Purposes)
Hauser Stander Tank Co., Cincinnati, O.
Woolford, G., Wood Tank Mfg. Co., Darby, Pa.

TANKS—WOOD OR STEEL (Rubber or Lead Lined)
Hauser Stander Tank Co., Cincinnati, O.
Dietzel Lead Burning Co., Keystone Bldg., Pittsburgh, Pa.
Lovsey, Charles H., Co., 704 Park Bldg., Pittsburgh, Pa.

TAPS (Collapsible)
National Acme Co., E. 131st St. & Colt Rd., Cleveland, O.

TAPS AND DIES
Landis Machine Co., Waynesboro, Pa.

TERNE PLATE—See TIN PLATE

TESTING MACHINES
Riehle Bros. Testing Machine Co., 1224 N. 9th St., Philadelphia, Pa.

THERMOCOUPLES
Taylor Instrument Companies, 95 Ames St., Rochester, N. Y.

THICKENERS
Dorr Company, 247 Park Ave., New York City.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.

TIE PLATES
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.

TIES (Creosoted)
Century Wood Preserving Co., 1053 Century Bldg., Pittsburgh, Pa.

TILE (Cement Roofing)
American Cement Tile Mfg. Co., Oliver Bldg., Pittsburgh, Pa.

TIN PLATE
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Granite City Steel Co., The, Granite City, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O.

TIN PLATE EQUIPMENT
Aetna-Standard Engineering Co., The, Youngstown, O.

TITANIUM
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

TOOL BITS (High Speed)
Firth-Sterling Steel Co., McKeesport, Pa.

TOOL BITS (Stellite)
Haynes-Stellite Co., 30 E. 42nd St., New York City.

TOOLS (Pneumatic)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction Sales Co., 342 Madison Ave., New York City.
Oxweld Acetylene Co. 30 E. 42nd St., New York City.

TOWERS (Transmission)
American Bridge Co., 71 Broadway, New York City.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Pacific Coast Steel Co., Hunter-Dulin Bldg., San Francisco.

TRAMRAILS
Cleveland Electric Tramrail, Division of the Cleveland Crane and Engineering Co., Wickliffe, O.
Harnischfeger Corp., 3811 National Ave., Milwaukee, Wis.

TRUCKS & TRACTORS (Electric Industrial)
Clark Tructractor Co., Battle Creek, Mich.

TREADS (Safety Stair and Ladder) —see GRATING (Non-Slipping)

TROLLEYS
Hanna Engineering Works, 1766 Elston Ave., Chicago, Ill.
Roeper Crane & Hoist Works, 1729 No. 10th St., Reading, Pa.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.

TRUCKS (Elevating)
National Scale Co., Chicopee Falls, Mass.

TRUCKS (Welding)
Oxweld Aceytlene Co., 30 E. 42nd St., New York City.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O.

TUBE MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, O.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh.

TUBES
Babcock & Wilcox Tube Co., 85 Liberty St., New York City.
Michigan Steel Tube Products Co., Holbrook and Buffalo Sts., Detroit, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

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Of any kind, in any gauge, made and shipped promptly. We also manufacture perforated Steel for Machinery Guards and carry a stock of perforated Steel. Write for our booklet.

ERDLE PERFORATING CO.
ROCHESTER NEW YORK

Perforated Metal Screens

any gauge plate
any size opening
any curvature to the plate

Also elevator buckets of all types, flights and troughs, stacks and tanks and similar equipment.

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All kinds and thicknesses of metal

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For screens, Centrifugal Linings, FilterPressPlates and other uses. Any metal, any size, any perforation.

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Tel. Canal 1459 CHICAGO, ILL.

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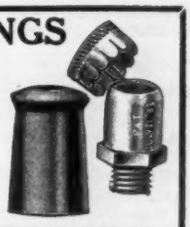
We manufacture ferrules and a diversified line of steel and brass stampings — to contract. Prompt service.



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WORCESTER, MASS., U. S. A.

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JOLIET, ILLINOIS

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NICETOWN PLATE WASHER CO., Inc.
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DEFORMED BARS, THREADED RODS
PUNCHED BARS OR PLATES
AWNING RODS, HEAVY DISCS, CAST IRON WASHERS
GALVANIZED BARS AND WASHERS
JUNIATA AND CLARISSA STS.
NICETOWN, PHILADELPHIA, PA.

TUBES Cont.

Paper & Textile Machinery Co., Sandusky, Ohio.
Pittsburgh Steel Products Co., Union Trust Bldg., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., The, Canton, O.
Tyler Tube & Pipe Co., The, Washington, Pa.

TUBES (Alloy)

Babcock & Wilcox Tube Co., 85 Liberty St., New York City.

TUBES (Boiler)

Babcock & Wilcox Tube Co., Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg. Pittsburgh, Pa.
Pittsburgh Steel Products Co., Union Trust Bldg., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tyler Tube & Pipe Co., The, Washington, Pa.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

TUBES (Charcoal Iron Boiler)

Bethlehem Steel Co., Bethlehem, Pa.
Tyler Tube & Pipe Co., The, Washington, Pa.

TUBES (Cold Drawn Seamless Steel)

National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Products Co., Union Trust Bldg., Pittsburgh.
Summerill Tubing Co., Bridgeport, Pa.
Timken Roller Bearing Co., The, Canton, O.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

TUBES (Lap-Welded Boiler)

Bethlehem Steel Co., Bethlehem, Pa.
Tyler Tube & Pipe Co., The, Washington, Pa.

TUBES (Non-Ferrous)

Paper & Textile Machinery Co., Sandusky, O.

TUBES (Seamless Iron)

Babcock & Wilcox Tube Co., 85 Liberty St., New York City.

TUBES (Welded Steel)

Michigan Steel Tube Products Co., Holbrook and Buffalo Sts., Detroit, Mich.

TUBING (Seamless Steel & Lap Welded)

Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh,

TURBINES (Steam)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

TURBO BLOWERS—See BLOWERS

TURNBUCKLES

Cleveland City Forge Co., 45th and Lakeside Aves., Cleveland, O.
Merrill Brothers, Maspeth, N. Y.

TURNTABLES

American Bridge Co., 71 Broadway, New York City.

TUYERES

Climax Fire Brick Co., Climax, Pa.

TWIST DRILLS—See DRILLS

UNIONS (Pipe)

Dart, E. M., Mfg. Co., Providence, R. I.

VALVES

Crane Co., 836 S. Michigan Blvd., Chicago, Ill.
Jenkins Brothers, 80 White St., New York City.

VALVES (Back Pressure)

Oxweld Acetylene Co., 30 E. 42nd St., New York City.

VALVES (Gas and Air Reversing)

Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Duff Patents Co., Inc., 321 Union Trust Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.

VALVES (Gate, Brass, Iron, Steel)

Crane Co., 836 S. Michigan Blvd., Chicago, Ill.

VALVES (Hydraulic)

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Pneumatic)

Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.

VALVES AND FITTINGS

Crane Co., 836 S. Michigan Blvd., Chicago, Ill.
Pittsburgh Piping & Equipment Co., 43rd St. & A. V. R. R., Pittsburgh, Pa.

VANADIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 120 Broadway, New York City.

VIADUCTS (Steel)—See BRIDGES BUILDINGS, VIADUCTS STACKS (Steel)

WALKAWAYS (Open Steel)—see FLOORING-STEEL (Ventilating, Nonslipping, Fireproof)

WALLS (Sectional Air Cooled)

Detrick, M. H., Co., 140 S. Dearborn St., Chicago, Ill.

WAREHOUSES (Iron and Steel)

Bliss & Laughlin, Inc., Harvey, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago.
Union Drawn Steel Co., Beaver Falls, Pa.

WASHERS (Iron Ore)

Dorr Company, 247 Park Ave., New York City.

WASHERS (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Joliet Wrought Washer Co., Joliet, Ill.
Nicetown Plate Washer Co., Inc., Juaniata & Clarissa Sts., Nicetown, Philadelphia, Pa.

WASHING MATERIAL (Rags)

Ford, The J. B., Co., Wyandotte, Mich.

WATER COOLED EQUIPMENT (For Open Hearth Furnaces)

Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

WATER FILTRATION & SOFTENING

Scaife, Wm. B., & Sons Co., Oakmont, Pa.

WATER SYSTEMS

Myers, F. E., & Brother Co., The, Ashland, Ohio.

WAX (Core, Wire, Pattern, Vent)

United Compound Co., 228 Elk St. Buffalo, N. Y.

WELDING (Forge & Hammer)

Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric Arc)

Chicago Steel & Wire Co., Fusion Welding Division, 103rd St. & Torrence Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Coit Rd. & Kirby Ave., Cleveland.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene Process)

Air Reduction Sales Co., 342 Madison Ave., New York City.
Chicago Steel & Wire Co., Fusion Welding Division, 103rd St. & Torrence Ave., Chicago, Ill.
International Oxygen Co., Newark, N. J.
Oxweld Acetylene Co., 30 E. 42nd St., New York City.

WELDING AND CUTTING (Gas)

Prest-O-Lite Co., Inc., The, 30 E. 42nd St., New York City.

WELDING FLUX (Iron, Brass Steel) See FLUX (Welding)

WELDING RODS (Tobin Bronze and Special Alloys)

American Brass Co., 25 Broadway, New York City.

WELDING RODS AND WIRE

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Chicago Steel & Wire Co., Fusion Welding Division, 103rd St. & Torrence Ave., Chicago, Ill.
Lincoln Electric Co., The, Coit Rd. & Kirby Ave., Cleveland, O.
Oxweld Acetylene Co. 30 E. 42nd St., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., Phillipsdale, R. I.
Williams & Co., Inc., 901-37 Penna Ave., Pittsburgh.

WHEELS (Car and Locomotive)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.

WINCHES

Sprague Electric Hoist Division of the Shepard Electric Crane & Hoist Co., 30 Church St., New York City.

WINDOWS—FIRE PROOF (Hollow Metal)

Migret, Rene, 7 Boulevard DeFontaine, Charleroi, Belgium.
Moeschl-Edwards Const. Co., The, 120 W. 9th St., Covington, Ky.

WIRE (Annealed, Bright, Galvanized)

Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., P. O. Box 72, Pittsburgh, Pa.

WIRE (Fence)

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., P. O. Box 72, Pittsburgh, Pa.

WIRE (Music)

Washburn Wire Co., Inc., 118th & Harlem River, New York City.

WIRE (Round, Flat, Square and Special Shapes)

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., Inc., 118th & Harlem River, New York City.

WIRE (Threaded)

Progressive Mfg. Co., Torrington, Conn.

WIRE (Welding)—See WELDING RODS

WIRE CLOTH

Cleveland Wire Cloth & Mfg. Co., 3571 E. 78 St., Cleveland, O.

WIRE FORMING MACHINERY

Nilson, A. H., Machine Co., Bridgeport, Conn.

WIRE FORMS

American Spring & Mfg. Co., Elm St., Holly, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.

WIRE MILL EQUIPMENT

Morgan Construction Co., Worcester, Mass.
Shuster, The F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Treadwell Engineering Co., Easton, Pa.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAIL MACHINERY

Bliss, E. W., Co., 53rd St., Brooklyn, N. Y.
National Machinery Co., Tiffin, O.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE NAILS—See NAILS

WIRE REELS

Nilson, A. H., Machine Co., Bridgeport, Conn.

WIRE ROPE AND FITTINGS

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE ROPE SLINGS

American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENERS

Nilson, A. H., Machine Co., Bridgeport, Conn.

WIRE STRAIGHTENERS AND CUTTING MACHINES

Shuster, The F. B., Co., New Haven, Conn.

ZIRCONIUM METAL AND ALLOYS

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

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SHEET MILL PRODUCTS
STRIP STEEL — STRIP STEEL SHEETS
TIN MILL PRODUCTS

Highest quality maintained through direct control of each process of manufacture — from iron ore to the finished commodity.

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General WEIRTON, W. VA. *Offices*

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also Japanning and Black Sheets

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Hot *and* Cold Rolled

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Union Trust Bldg. Pittsburgh, Pa.

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QUALITY - ACCURACY - UNIFORMITY

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OLIVER IRON & STEEL CORP.
MORRIS & BAILEY DIVISION
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BILLETS BLOOMS
LACLEDE STEEL COMPANY
ARCADE BLDG. · ST. LOUIS, MO.
REINFORCING STEEL BARS
DISTRICT OFFICES · CHICAGO, DETROIT, KANSAS CITY

NEWSTEEL TRADE MARK

AUTOMOBILE METAL FURNITURE
FULL PICKLED SINGLE PICKLED
STEEL SHEETS

THE NEWTON STEEL COMPANY

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NEWTON FALLS, OHIO

NEWSTEEL TRADE MARK

This Floor Plate Covers Every Requirement, Plus.

In addition to having all the good features of the ordinary floor plate, it offers advantages not found in others.

Its newly designed projections have been planned and spaced so perfectly that the foot hardly notices them until it starts to slip; then it is gripped instantly.

(Magnified Section of Central Floor Plate)

Ask for Central Floor Plate! Let us send you a sample.

Note the remarkable gripping surface, the perfect distance between projections, the design of the gripping projections.

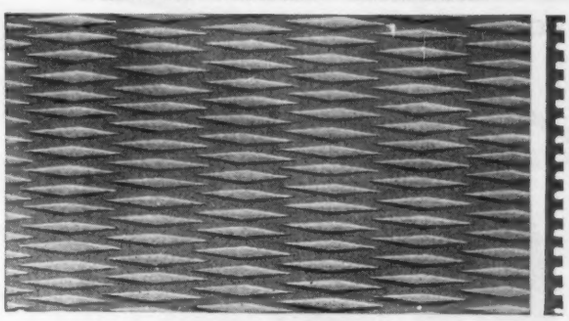
CENTRAL IRON & STEEL Co.
HARRISBURG, PENN.

Branch offices in all principal cities

Reg. U. S. Pat. Office

Underwriters' Laboratories Inspected, S. A. 443

Rolled Steel *"NEVERSLIP"* Floor Plates



RAISED DIAMOND
DIAMOND and Ribbed Pattern

AMERICAN PRESSED STEEL CO.
PHILADELPHIA, PA.
The original diamond pattern floorplate.

SHARON STEEL HOOP COMPANY

GENERAL OFFICE

SHARON PENNSYLVANIA

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COLD ROLLED STRIP STEEL
ESPECIALLY
FOR
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CANADIAN REPRESENTATIVES—HUGH RUSSEL & SONS, LTD., MONTREAL TORONTO

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We point with special emphasis to the facilities provided at West Leechburg for serving both large and small users.

For Tonnage Production — Our 20-16" Strip Mill — one of the largest and most complete Mills — Assuring Prompt Shipment and Reliable Service.

For prompt delivery of small quantities we maintain continuous operation of merchant mills, flexible in range of sizes and adapted to quick roll changes.

WEST LEECHBURG STEEL COMPANY

General Offices:

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SALES OFFICES

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New England—27 Ardmore Road West Hartford, Conn. Toledo—906 Ohio Bldg. Cincinnati—2107 Union Central Bldg.

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ACME STRIP

¼ TO 20 INCHES WIDE

ELECTRO GALVANIZED UP TO 12 INCHES WIDE

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GENERAL OFFICES CHICAGO

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Heroult Electric Furnaces
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Fabricated Structural Steel for Every Purpose

Offices in Principal Cities

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for Buildings and Bridges
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PITTSBURGH, PA.

THE OHIO STRUCTURAL STEEL CO.
NEWTON FALLS, O.
ENGINEERS, FABRICATORS & ERECTORS
OF STEEL CONSTRUCTION

McClintic-Marshall Company
Steel Bridges & Buildings
Pittsburgh, Pa.—Offices in Principal Cities

FABRICATED STRUCTURAL STEEL
FOR BUILDINGS, BRIDGES, ETC.
THE ALLIANCE STRUCTURAL CO.
ALLIANCE, OHIO

BELMONT IRON WORKS
PHILADELPHIA NEW YORK EDDYSTONE
Engineers · Contractors · Exporters
STRUCTURAL STEEL
Complete Industrial Buildings
Main Office—22nd St. and Washington Ave., Phila., Penna.

THE PHOENIX IRON CO.
Manufacturers of
Open Hearth
Structural Steel Shapes
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Works: Phoenixville, Pa. Main Office: Philadelphia, Pa.
OFFICES
City Savings Bank Bldg., Albany, N. Y. 30 Church St., New York
110 State St., Boston Munsey Building, Washington
26 Victoria St., London

THE PHOENIX BRIDGE CO.
Engineers, Fabricators and Erectors
Bridges and Other Structures of Steel
Capacity 60,000 Tons Works and Engineering Office: Phoenixville, Pa.

KIDD

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Drill Rod

Small Flat Key Steel

Needle Bar Steel

Special Shapes

WE specialize in Drill Rod for Tempered Shafts, Dowel Pins, Rollers, Arbors, Screws, Taps, Drills, Reamers, Punches or high grade tools of any kind.

Specify KIDD Quality—for distinctive service.

Send for our New Catalog

Kidd Drawn Steel Co.

Aliquippa, Pa.

(Pittsburgh District)

Over 30 Years Satisfactory Service

Buying Satisfaction Rests on Confidence
Years of meritorious service protect you when you place your confidence in ILLINOIS STEEL
Illinois Steel Company
General Offices 208 So. La Salle St.
CHICAGO, ILLINOIS

TENNESSEE

Coal, Iron & Railroad Company

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Steel Products

Standard and Light Rails, Angle Bars, Track Bolts, Track Spikes, Tie Plates, Bars, Plates, Shapes, Sheets (Blue Annealed, Black and Galvanized), Axles, Forgings, Steel Castings, Semi-finished Material, Pig Iron.

GENERAL OFFICES: Brown-Marx Building, Birmingham, Ala.

Branch Offices—Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul.

Pacific Coast Representatives—United States Steel Products Company San Francisco, Seattle, Portland, Los Angeles, Honolulu.

Export Representatives—U. S. Steel Products Company, New York City

VANADIUM-ALLOYS STEEL COMPANY

LATROBE, PENNSYLVANIA

MANUFACTURERS OF "Red Cut Superior" THE NATIONALLY KNOWN HIGH SPEED STEEL

MANUFACTURERS OF VASCO QUALITY TOOL STEELS

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PACIFIC COAST STEEL COMPANY

MANUFACTURERS OF

OPEN HEARTH STEEL

STRUCTURAL SHAPES MERCHANT REINFORCING BARS
TRANSMISSION TOWERS AND STRUCTURES

Gen'l Office: Hunter-Dulin Bldg., San Francisco

Plants: San Francisco, Portland, Seattle

For pickling steel

BB COMPOUND

Sold exclusively by

Bradley Higbie & Company

1225 McCormick Bldg. Chicago, Ill.

BILLETS
SLABS-SHEET BARS

Direct Mill Shipments

THE HAUSMAN & WIMMER CO.

PITTSBURGH—NEW YORK—DETROIT

CARBON TOOL STEELS

ALSO

HIGH SPEED STAINLESS & SPECIAL ALLOY STEELS

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

SUPERIOR

COLD DRAWN FREE CUTTING

SCREW STOCK

Superior Steel Products Co.

Monaca, Pa.

ACID OPEN HEARTH STEEL

Ingots & Billets

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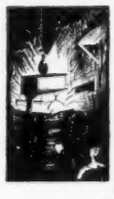

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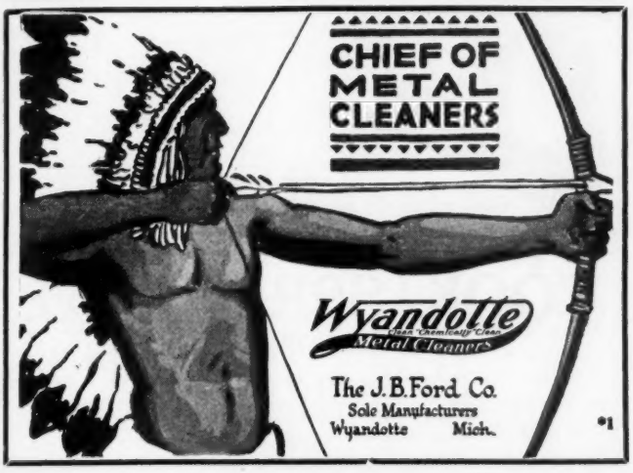

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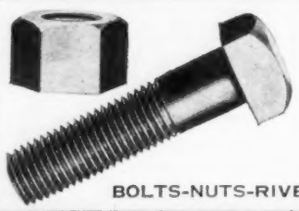

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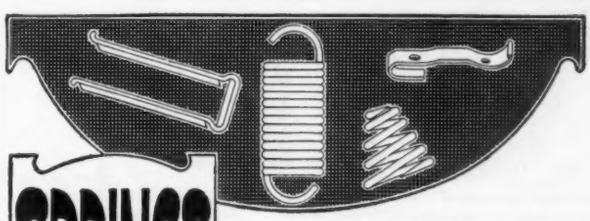

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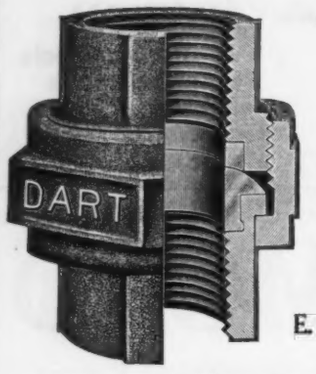

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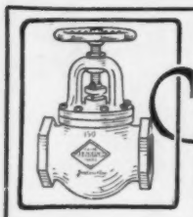

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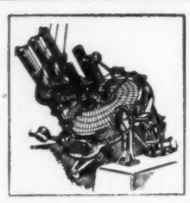

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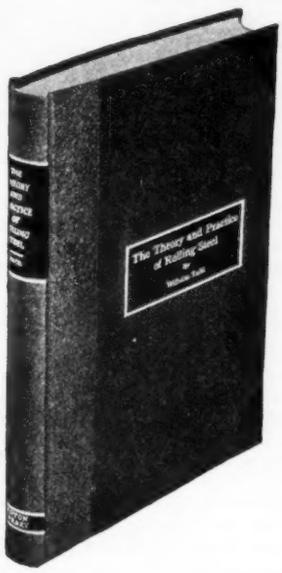

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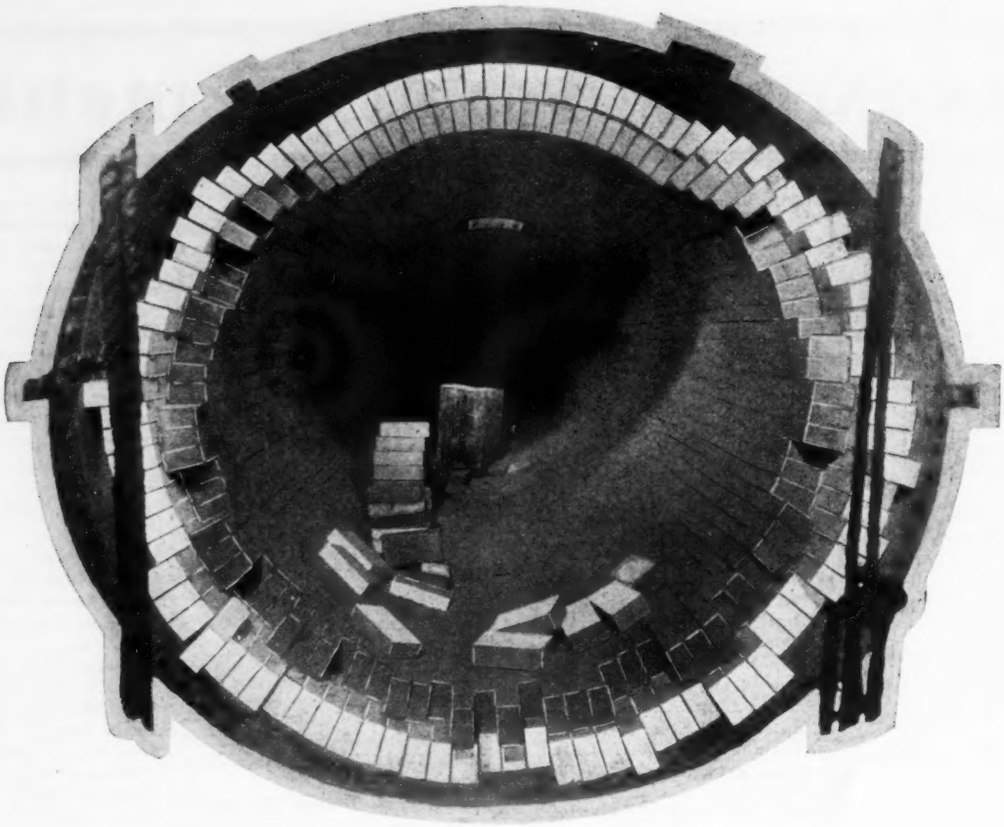

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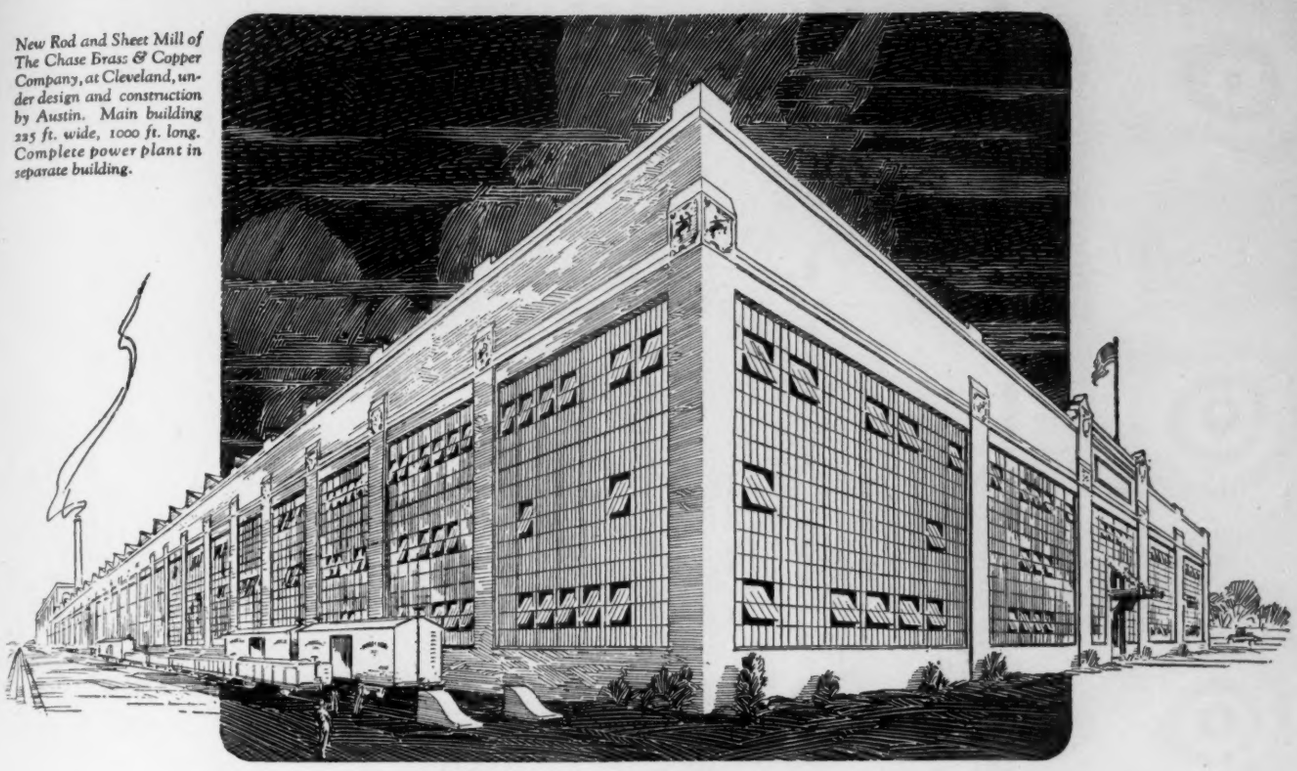
Celite Products Limited, New Birks Bldg., Montreal, Quebec
Celite Products Corporation, Windsor House, Westminster, London



New Rod and Sheet Mill of The Chase Brass & Copper Company, at Cleveland, under design and construction by Austin. Main building 225 ft. wide, 1000 ft. long. Complete power plant in separate building.

New Chase Brass Mill—

Austin Designs and Builds for Straight Line Production

THE new Rod and Sheet Mill of The Chase Brass & Copper Company, makers of Alpha Brass Pipe, now under design and construction by Austin, represents the finest type of efficient straight line production mill.

Starting the middle of November, work will be carried right through the winter so that The Chase Brass & Copper Company may start to supply its midwestern customers from the new mill by next June.

You can profit by the advantages of the Austin Method in your own building program. This nation-wide organization will supply designing, building and equipment service under one contract and guarantee in advance the low total cost, completion date within a specified short time, high quality of materials and workmanship.

Whatever the type or size of building project you are considering, Austin is ready at all times to render valuable assistance, both in designing and in the actual construction, with speed and economy.

For information, approximate costs, etc. phone the nearest Austin office, wire or send the Memo.

THE AUSTIN COMPANY, *Engineers and Builders,* Cleveland

New York Chicago Philadelphia Detroit Cincinnati Pittsburgh St. Louis Seattle Portland
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Memo to THE AUSTIN COMPANY, *Cleveland*— We are interested in a

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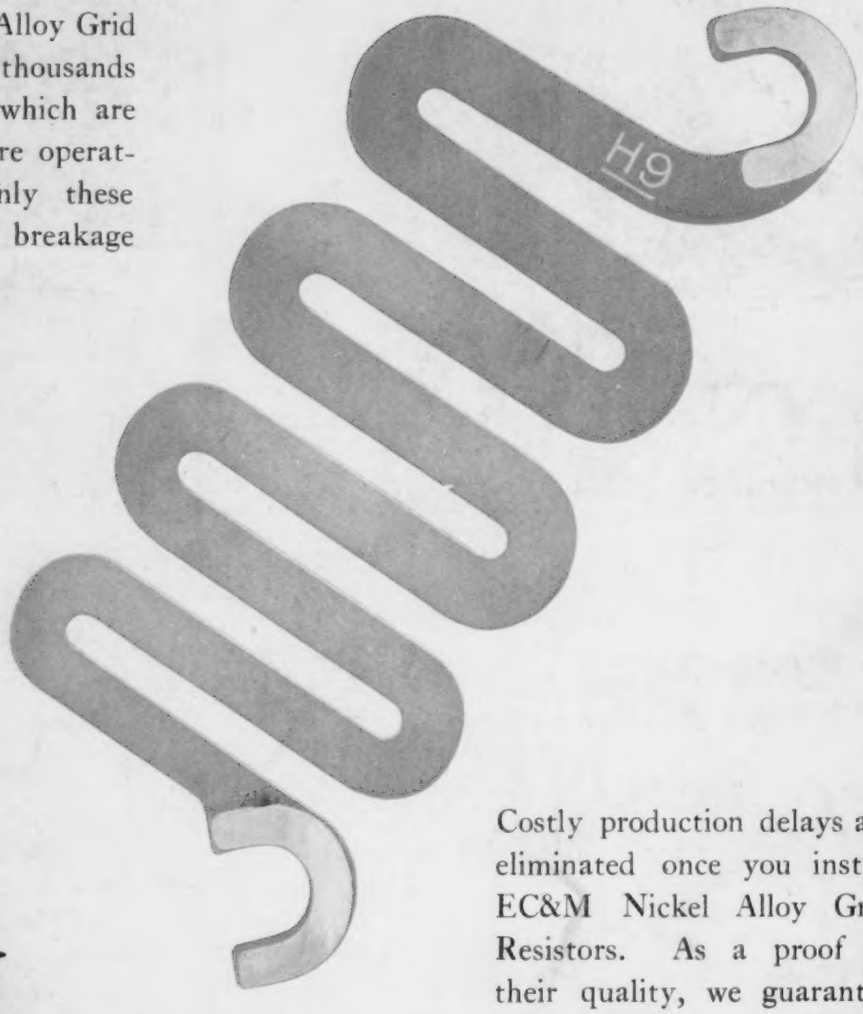
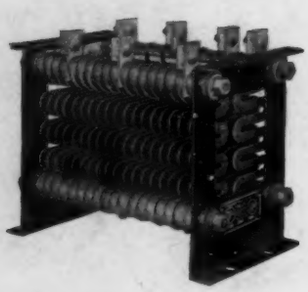
Nickel Alloy Grid Resistors prove their superiority

Only two reports of grids broken in service since October, 1927, when EC&M first announced Nickel Alloy Grid Resistors. Of the thousands shipped, many of which are working under severe operating conditions, only these two instances of breakage have reached us.





Costly production delays are eliminated once you install EC&M Nickel Alloy Grid Resistors. As a proof of their quality, we guarantee to replace, free of charge, any of these grids broken, either, in service or in shipment.

Write for Bulletin 940

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